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## High – rise Housing and Social Interaction Study under Current Chinese High-rise Residential Situation

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**High – rise Housing and Social Interaction Study under  
Current Chinese High-rise Residential Situation**

By Yao Yao

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of  
Architecture

Department of Architecture

Golisano Institute for Sustainability

ROCHESTER INSTITUTE OF TECHNOLOGY

ROCHESTER, NY

Spring 2020

## Committee Approval

“High-rise Housing and Social Interaction Study under Current Chinese High-rise Residential Situation.”

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## **Abstract**

High-rise residential buildings, accommodating the significant amount of Chinese population in urban areas, has been the most primary housing style in great cities of China today, due to the conflict between severe Chinese land use and huge population. However, after moving to high-rise housing, Chinese residents in high-rise buildings barely have social interaction with each other compared with the past decades. Additionally, less social interaction in residential housing could lead to a series of problems which have a negative influence on people's daily lives.

Through a summary of previous research and a questionnaire, to investigate the current situation of social interaction among Chinese residents in high-rise housing and urban residential community, followed by exploring the reasons for why the social problem appeared among high-rise residents. The result shows that social interaction between buildings is quite significant, while the problem of social interaction has been increasingly popular in urban high-rise residential community in the new generation. Also, the causes are various, including change of residents' minds and lack of public factors.

Based on the research and survey, proposing suggestions, such as design optimization and policy change, is aimed to improve future high-rise housing development in order to solve the social problem in Chinese society.

### **Key words:**

High-rise buildings, social interaction, Chinese society, public space



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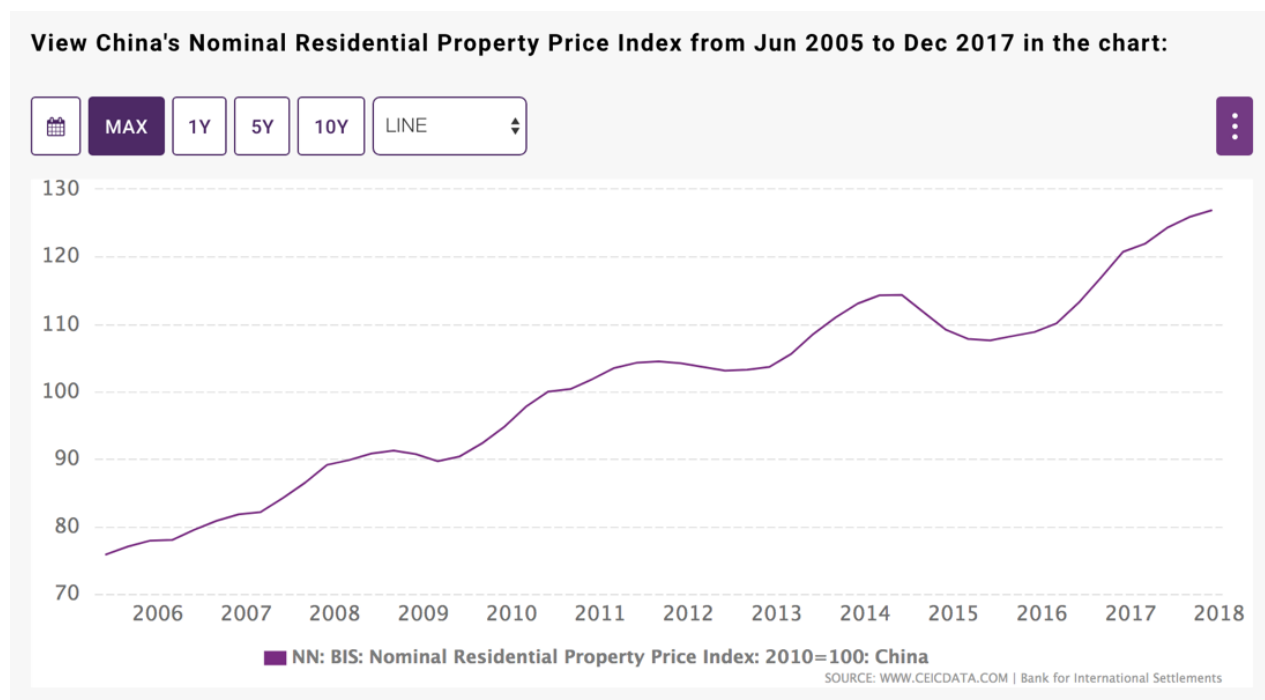
## **Introduction**

The invention of the elevator during the Second Industrial Revolution led to high-rise building rapid development since the 20th century (Schumm, 2014). With time goes by, in China, more and more people would like to move into the developed high and middle-dense urban areas, so as to get a better education, better civic services, security protection, completed infrastructure and more working opportunities from 30 years ago. That was the one of the main reasons for urban population exploration in great Chinese cities (Barr, 2018). Today, around 700 million people are living in urban areas, which occupies 54.7% of the total Chinese population (Sengupta, 2014). Therefore, in order to accommodate the increasing population in urban areas, vertically and horizontally enlarging cities' capacity are two common ways worldwide under current technology (Buckingham, 2014). However, because of the limitation of Chinese geography and growing land price, unlimited horizontally expanding cities' boundaries is expensive and unpractical, even overbidding. Also, after expansion, the government still need to spend much money to develop these urban sprawl areas. Meanwhile, unlimited expansion is negative for urban centralization and socialization.

Hence, vertically development, as building high-rise buildings or skyscrapers in China, has been the primary way to house the significant number of citizens for living, working and having entertainment in a city (Florida, 2016). Today and in the following several years, high-rise residential buildings are and still will be the dominant living method in most Chinese cities.

According to old Chinese high-rise building standards, the structure under eight floors is multiple-level building, near 20 levels is mid-rise building, around 30 stories or 100 meters is a

high-rise building. Now, based on new standards, the structure which is higher than 28 meters or 10 floors defined as a high-rise building (JGJ 3-2010 Technical specification for concrete structures of tall building, 2011). In this research paper, the concerned high-rise buildings are more than 10 floors and lower than 100 meters.



*Figure 1 China's Nominal Residential Property Price Index from Jun 2005 to Dec 2017*

During the past decades, in most Chinese cities center, traditional housing and low-rise buildings have been demolished because of old structure and usefulness, while new and more stable high-rise buildings are built on after-demolished locations (Shepard, Half the houses will be demolished within 20 years: on the disposable cities of China, 2015). In China, there are more than 347,000 high rise-buildings and around 6,000 buildings over 100 meters built in urban areas by 2017 (Khidia, 2015). High-rise housing does bring many advantages for cities and people's lives besides providing more living spaces for people (Yaskova, 2017). For example, high-rise building can maximize the land use, promote surrounding development, remit speed of urban sprawl, offer better security than the ground-level house, and give an unforgettable view towards the city.

Additionally, Chinese residents in this generation have accepted high-rise housing and are willing to high-rise living in urban areas (Ekblad, 1990).



*Figure 2 Photo of High-Tech Zone of Xi'an in 1990*



*Figure 3 Photo of High-Tech Zone of Xi'an in 2018*

Generally, current and old-fashioned high-rise housing can basically satisfy people's physical living requirements and needs, but it cannot completely achieve social interaction among neighbors which is one of the most important and necessary parts in people's lives (Jian, 2012). According to pervious research, great social contact between neighbors promote residents to have a stronger sense of belonging, reinforce people's living safety level, optimize living environment and atmosphere, change the living style and help children be more independent (Clifford, 2007). On the other hand, building and keeping social interaction among neighbors is a traditional awareness in Chinese people's mind (Ellis, 2009), However, now the great social connection is not obviously remained. Therefore, paying more attention to improve social cohesion in Chinese high-rise buildings is a critical aspect in high-rise housing future development (Jian, 2012).

Based on the pervious information, the main doubt in Chinese residential architecture is if social interaction still necessarily needed among Chinese residents in high-rise residential buildings in current society. Therefore, refer to Chinese culture, policies as well as traditional living styles. the purpose of this research is to verify if this social problem is far serious in China or not, explore current situation of Chinese high-rise housing and main reasons about the social problem, collect local people's attitudes towards social interaction in residential environment, review people's living in traditional Chinese housing, and seek some implement and ideas of social improvement in high-rise buildings.

## **Problem Statement**

In human being's lives, social interaction is one of the most important basic needs. Social interaction, even only for a short time, is a meaningful communication between human beings, people really share ideas, thoughts and items with each other during the process (Development, 2018). Moreover, social psychology illustrates that people's primary need of selecting residential type and environment is the need of social interaction with their neighbors (Tassinari, 2004).

Social interaction in residential housing throughout China can be defined as that people are willing to have any kind of social communication with one another, formally and informally, such as chatting, greeting, playing with others, and helping each other (Yu, March 2007). For example, people ask their neighbors to look after their children when they must go outside by themselves, or residents actively invite neighbors to celebrate festival together.

The amount of high-rise residential buildings is being increasing in China, which has been the dominate residential way in urban and suburban areas of great cities in order to accommodate the significant population. In the future, the high-rise housing will still be incredibly developed due to Chinese government may move 250 million rural people into new urban areas in the following years. (Khidia, 2015).

As mentioned in the previous reports, theoretically speaking, social interaction in neighborhoods is quite significant for people's development and lives, even health (Zuzana, 2012). While in current real Chinese society, high-rise building, as the most popular residential housing style, causes social problems across the whole country. High-rise building provides more opportunities for people to know their neighbors, because it houses many people, has simple circulation and makes people live close to others (Jian, 2012). However, residents living in high-

rise buildings do not have much social interaction with others nowadays, residents isolated by solid walls and floors, physically and psychologically. From a research, there is only 21.6% residents living in high-rise buildings acknowledged that they had social interaction, formally and informally, with their neighbors (Song, 2004). Recently, a research from Chinese Youth Daily Survey Center shows that, through the survey about relationship between neighbors, 40.6% of participants are not familiar with their neighbors, even 12.7% of participants do not know their neighbors. And for the people living in urban areas, 45.1% of them are not familiar with their neighbors, while 29.0% of people living in town and 11.0% of people living in villages are not familiar with neighbors. In addition, only 18.5% of participants acknowledge that they would look for neighbors for help when they meet any trouble. Overall, 80.9% of total residents feel the relationship between neighbors becoming increasingly indifferent. (Daily, 2011). After a whole-day work, residents directly go back to their apartment, they barely talk to each other when they meet in the corridor and elevator. Sometimes, resident even do not know who are living in next door after several years (Wenming.cn, 2014). The phenomenon is called “neighborhood estrangement”, based on that, relationship between residents became detached and unbelievable, more and more disputes happened between neighbors, and crimes frequently happened in non-supervised public areas (Li F. , 2012).

Overall, social interaction lost or neighborhood estrangement is increasingly serious in Chinese high-rise housing, even Chinese government has appealed that rebuilding positive social interaction between residents is the base of building harmonious society, which is one of the most important Chinese policies from 2007 (Liu W. , 2007). Social problem in high-rise residential buildings is the assignable problem in Chinese modern society and residential architecture.

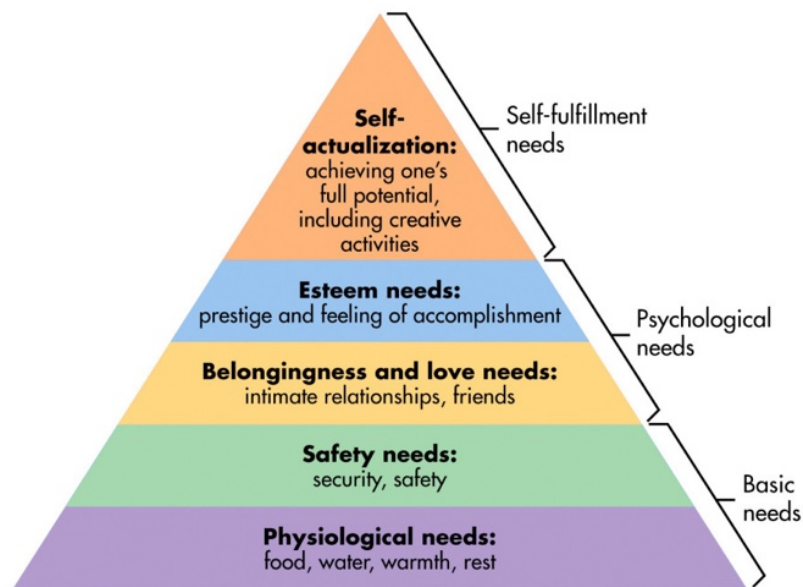
## Literature Review

### 1. Social interaction between buildings in people's lives

People's social interaction is the base of urban existing. Urban planning and residential community design must respond to the fact. (C.I.A.M, Dec. 12, 1977.)

#### 1.1 People's basic needs of social interaction in residential buildings

People's needs comprise a five-tier model, "from the bottom to the top, people's needs are Physiological, Safety, Love and belonging, Esteem and Self-actualization." And higher needs will be satisfied before lower needs are satisfied." (Maslow, 1943) Although this psychological study proposed in 1943, it still has some value in society development.



*Figure 4 Maslow's Hierarchy of human needs*

Some other studies related to child psychology also illustrate that human beings have innate motivation and power to look for connections with other people since they are born, which would sustain and might be reinforced in their life (Science, 2017).



In this generation, since the quality of the living environment, living safety, and building itself are going to be better and better, people feel that their basic needs of physiological and safety about living conditions have increasingly satisfied. Hence people have started to look for the new step of love and belonging in housing, which including friendship and relationship with neighbors, social atmosphere and sense of belonging. Under this phenomenon, in China, the container high-rise buildings cannot be accepted by some residents any more in these years, that resulted in that some residents moved out from the traditional container high-rise buildings, followed by moving into more expensive with well-designed social infrastructure, while those traditional high-rise buildings became empty and worn-out. (Jian, 2012)

## 1.2 Social interaction between buildings can promote people's daily lives

Social interaction plays a pretty significant role in people's daily life, social interaction in residential housing is a part of society. People organize production through interaction to achieve successful communication, and also people get information, inspiration from the interaction. Social interaction reflects people's sociality, and it is an essential determinant of individual emotions. People cannot live and produce without social interaction and communication either in the working area or residential areas. People spend over 65 percent of a whole life in residential areas, and residential areas are also important environment to cultivate children's characters and primary places for old people to enjoy their remaining years. So that social interaction in people's living areas is critical. (Yu, March 2007)

### 1.3 Social interaction for children and old people in high-rise buildings

Children living in High-rise buildings would reduce possibilities of developing their creativity, identity, mind and new capacities if they cannot have much social interaction with others. It is not easy for smaller children to get contact with their parents when they are playing outside the high-rise buildings alone, so that their parents would feel unsafe then forbid their children to go outside by themselves. Also, some high-rise residential buildings do not set a well-protected playground. The reasons would make children lose many chances to play with other similar aged kids, that is harmful to their growth. On the other hand, for old people, loneliness can be seen among older adults in high-rise housing since it is difficult for them to build friendship and contacts with unfamiliar people due to Chinese culture. (Ekblad, 1990)



*Figure 5 Children are left home alone in high-rise buildings*

### 1.4 Social interaction between residential buildings and residential safety

People in one community or residential building are familiar with each, and take care of each other would have benefit for community safety (Jacobs, 1961). In many current high-rise

communities, residents do not have a sense of belonging to their residential areas, and they do not have a responsibility to maintain the public spaces and infrastructure. From some examples, Residents do not care about each other, and open spaces are not being supervised and maintained, crimes always happened in these areas, such as steal and rob, that makes residents under unsafe pressure. (Xu, 1987)

## **2. Pervious research about the reasons for bare social interaction in high-rise housing**

### **2.1 People**

Compared with last decades, currently, people's income is increasing with development of economy, so that people decreasingly need to get reciprocal benefits from neighbors, people can purchase what they need from market rather than borrow items from neighbors (Guo, 2009).

People spend more time on studying and working, also young people wallow themselves in communicating with others through Internet and telephone, finally they ignore developing the relationship with family members and neighbors face to face (Wang, 2005).

Children are not allowed to go downstairs and play alone because parents feel unsafe (Hongyun, 2006), old people still feel inconvenient to go upstairs and downstairs though there are elevators in high-rise buildings (Hongyun, 2006).

Nowadays, in commercial residential buildings, residents, especially young residents, come from different places with different backgrounds, they do not have basic credibility with neighbors before, so that they are feeling not easy to have social interaction with neighbors (Han, 2011).

Residents do not easily trust their neighbors sometimes, they are afraid that the neighbors may come up crime and damage, so that Chinese residents are increasingly using intelligent door

lock, not only for convenient, but also to protect themselves. From the research, the sales volume of Chinese intelligent lock will reach 35 million by 2020 (Yi ou, 2019).

## 2.2 Public space, semi-public space and semi-private space in high-rise buildings

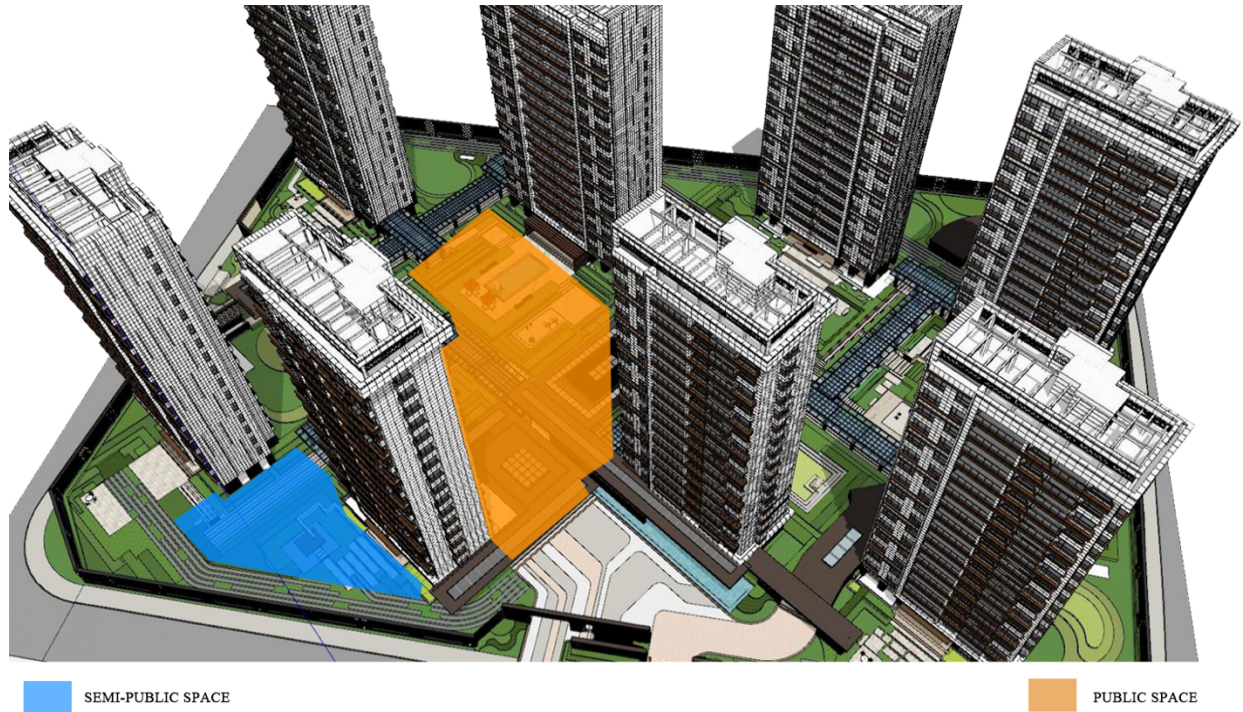
The space plays a significant role in high-rise buildings to guide people's social interaction. The better quality physical outdoor space will increase opportunities of optional and social activities in buildings (Gehl, 1987), and life between buildings offer chances for residents to have social interaction in a relaxed and easy way (Gehl, 1987).



*Figure 6 Life between buildings*

Definition of public space, semi-public space, semi-private space in a high-rise housing





*Figure 7 Definition of public space and semi-public space in a high-rise community*

**Public space:** shared by all residents in a community, always located in the center of the area, such as a central garden, swimming pool, and public children playground.



*Figure 8 public space (central garden or club)*

**Semi-public space,** frequently used by adjacent residents, always between two high-rise buildings, in front of entrance of each building.





Figure 9 Semi-public space (space around entrance of each high-rise building)

**Semi-private space**, located inside of the high-rise buildings, used by residents on each floor, such as elevator lobby, inside corridor, open platform.

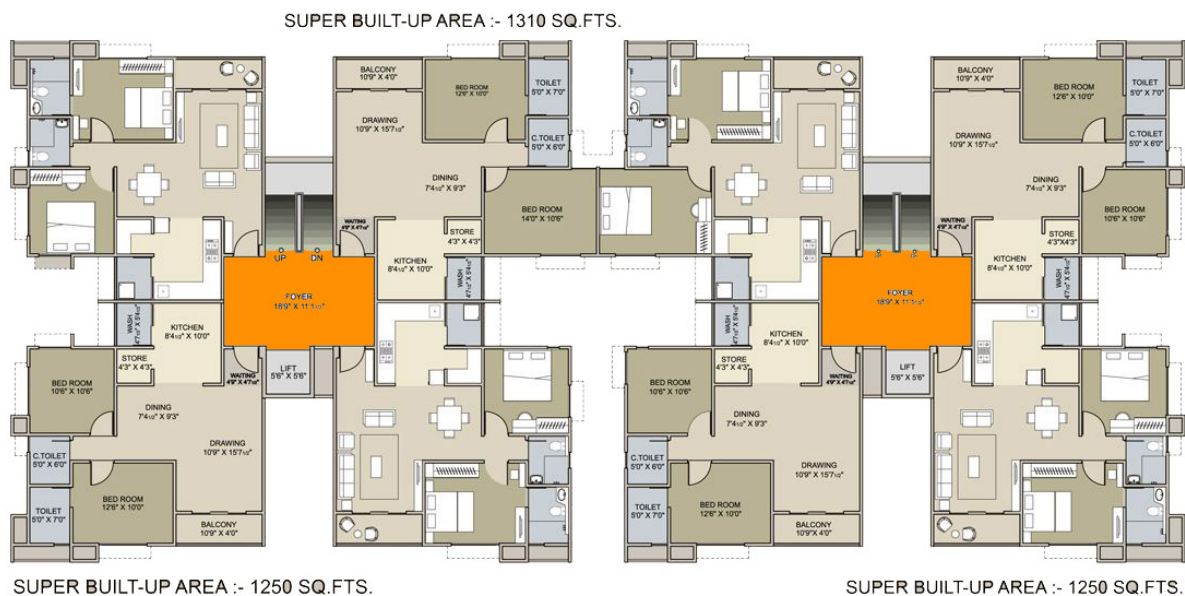


Figure 10 Semi-private space (on each floor inside the building)

### 2.2.1 Not well-designed public space and semi-public space in high-rise housing

Incorrect semi-public space and semi-private space design in current Chinese high-rise buildings lead to many troubles blocking people's social interaction. Firstly, the interior of each apartment within a high-rise housing becomes plentiful, bigger and better, while Chinese high-rise housing has a significant mistake in semi-public and semi-private areas design, and due to financial reasons, this mistake is one of the most primary problems for the current social unhealthy development in high-rise buildings. The mentioned above semi-private and semi-public space, such as elevator lobby, corridor, open platform, and staircase, are pretty narrow, have bad airflow as well as not enough daylight. Especially in some old buildings, these semi-public spaces are occupied by residents' personal belongings all the time. Therefore, residents would not like to stay for a while and do any social activities in the public space under this phenomenon, with time goes by, this kind of areas are only used for fast circulation. After that, without communication with other people, people even unfamiliar with the neighbors who are living on the same floor, residents lost a sense of belonging to their lived building. On the other hand, some old high-rise buildings pay less attention to monitor and manage these public spaces that leads to these spaces become unsafe and crimes usually happened in these areas (Jian, 2012).

Shown in the figure 10, in this project, the area of each apartment is quite big enough, but the semi-private space, like elevator lobby, only occupies pretty small area on the limited footprint. People would not have so much interest in staying in such small semi-private space with no natural airflow to interact with neighbors.

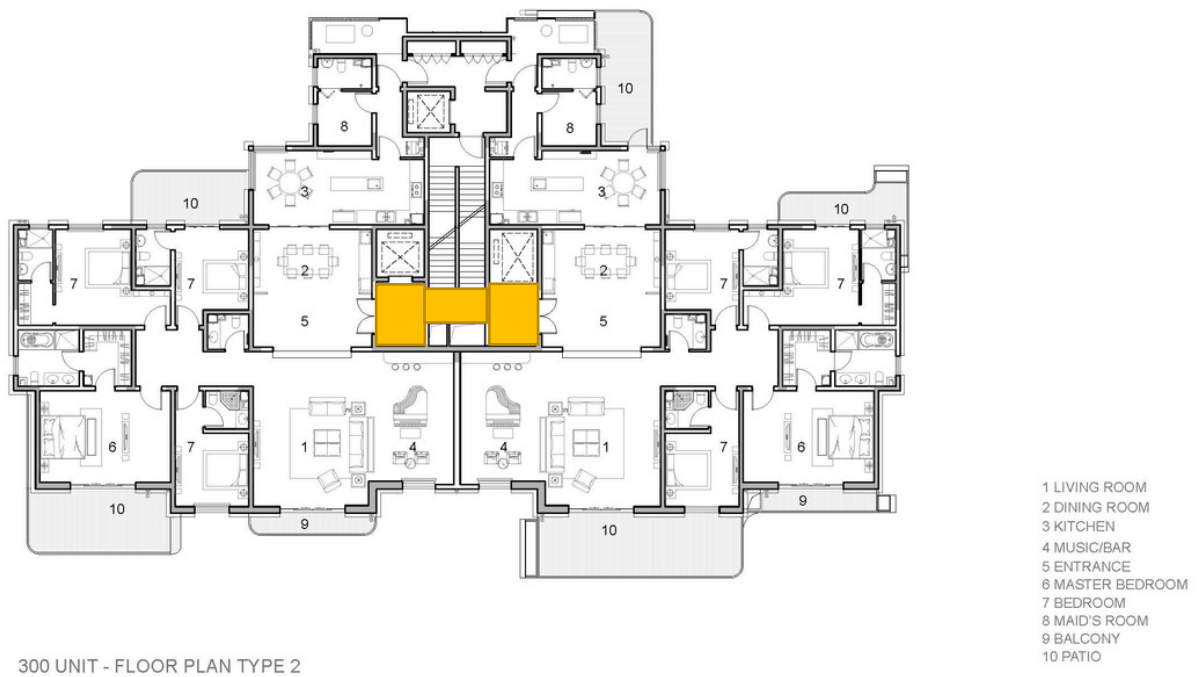


Figure 11 Hanhai Luxury Condos typical floor plan (semi-private space is too small)

### 2.2.2 Reason for narrow public space and semi-public space

However, this phenomenon of narrow semi-public space is pretty common in high-rise buildings in China because of property developers' preference. Nowadays, because the living area per capita is low and living quality is not right in China, residents' main preferences are to increase private living area and improve living physical environment. However, property developers minimize the field of public spaces to reduce their cost, to get a maximum benefit in a favorite commercial-residential building which has a limited building footprint. This kind of high-rise buildings are named "container high-rise building". Adding public spaces means adding the non-residential area, that will lead to increase the cost and budget, and the bill of these spaces are paid by each resident, in other words, the selling price of apartments in high-rise buildings with bigger public spaces is much higher than ones without or have fewer public areas. However, paying too much extra money for the shared public space is not popularly accepted by residents currently in



China. Under this pressure, the property developer would not like to build high-rise buildings with large public areas. (Jian, 2012).



*Figure 12 Public space between residential buildings became a mess parking lot*

From the figure 12, the big empty outdoor public space does not have completed planning before, it loses its attraction to residents, so that the big public area becomes an unorganized parking lot rather than a place providing outdoor activities.

### 2.2.3 Huge public space does not have good management

Generally, high-rise building community have huge ground outdoor spaces between high-rise buildings due to the consideration about sunshine spacing and traffic system from design, but the enormous empty outdoor spaces sometimes lack of sense of enclosed and recognizable so that one barely have an attraction, which leading to people hardly have an interest in staying in such outdoor public space and doing activities. (Hongyun, 2006). On the other hand, a lot of architects or designers deem that outdoor residential environment is outdoor landscape or green coverage, so they just place trees and green plants in outdoor public space without deeper consideration.

#### 2.2.4 Community circulation way reduces residents' usage of public space

Some high-rise building communities do have proper consideration on outdoor social spaces, but people hardly use these outdoor spaces; instead, they go to underground parking directly then go home by elevator from underground level. Thus, they barely have space and time to meet more neighbors, which could reduce the potential chances of social interaction (Hongyun, 2006).

#### 2.2.5 Community planning (orientation of public space) has passive impact on social interaction

In a lot of Chinese middle-rise or high-rise housing community built in last 20 to 30 years, there is only one public garden or square located in the right center of the whole community area, but the space between two residential buildings does not have great design and organization. That leads to people living surrounding or near the central garden might use the garden frequently, but it is not convenient for the rest residents who living far from the garden to use that every day. Under this situation, the community planning decreases residents' enthusiasm to have social interaction with others in such places. Nowadays, besides central public space, community planning turned to set more than one semi-public space located in different places in the community. However, according to a survey, these closer spaces are always used by people who are living on 1- 3 floors, the residents living above 4<sup>th</sup> floor still hardly use such spaces, especially senior people. (Huang, 2007. 11)

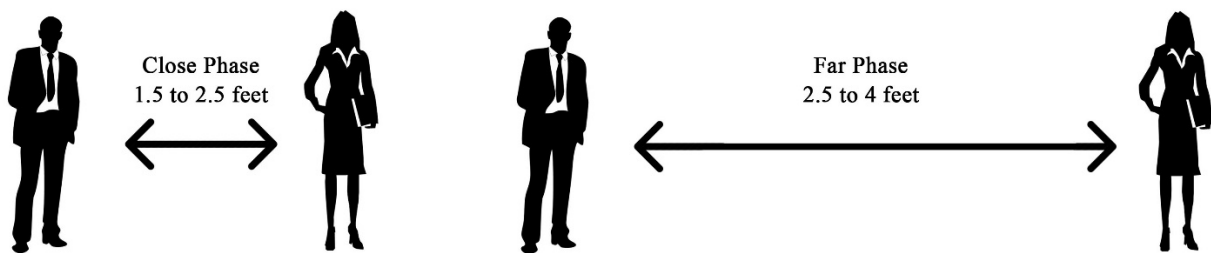
#### 3.2.6 Comfort indoor space reduces people's expectation of outdoor activities

Developed and comfortable private living space is another limitation for social interaction. With the improvement of individual living conditions, residents, especially young people, prefer to spend their free time in their own perfect private living space rather than go outside. The indoor

space can include many functional items, such as family cinema, exercise equipment, meeting and activity space, residents can enjoy that home. Thus, the chance of potential social interaction is being reduced, people become more indifference with neighbors under this situation (Xu, 1987).

### 3.2.7 Elevator case is not a comfortable place for social interaction

Besides the people and public and semi-public space problem, circulation space, as a connection between every single resident, initially should be another chance for residents to know and communicate with each other. Compared with low or mid-rise buildings, elevators instead stairs becoming people's main circulation way. However, elevators have a negative impact on residents' normal social interactions. Firstly, people stay in elevators shortly, they do not have enough time to have formal communication with others before they get to their destinations; secondly, the high speed of elevator may make people feel unstable and nervous, people pay more attention to the motor process of elevator than other people; thirdly, elevator car likes a "case", people are under the stress of closed and crowded in the "case", and also elevator car sometimes cannot provide people regular personal space and normal social distance with each other in regular social communication (Xu, 1987). Additionally, in a previous survey, 49% of participants deem that they spent too much time on waiting for elevators in high-rise housing, only 10% of all participants think that the elevator is running fast (Li M. , 2009).



*Figure 13 Normal social distance*



*Figure 14 Elevator cannot provide normal social distance*

The figure 12 and 13 indicate that for people have close relationship, the normal distance between two of them should be 1.5 to 2.5 feet, while for people have regular relationship or far relationship, they should keep 2.5 to 4 feet away from each other. But in most cases in China, elevator, subway, train and public transportation cannot guarantee the social distance among people, hence it is not comfortable and safe for people to social interact with others normally.

#### 2.2.8 Orientation of high-rise housing

The low-rise or mid-rise buildings can attach to each other and arrange horizontally, this orientation creates the ground friendly and suitable sized outside public and semi-public space in front of the buildings, however, because of the mass of high-rise buildings, solar requirement and ventilation needs, the high-rise buildings have to build separately, which makes the same energetic



outdoor spaces happened in low-rise or mid-rise buildings community cannot be achieved, therefore, the outdoor spaces in high-rise housing hardly conform to residents' traditional minds, that reduces people's expectation of outdoor social interaction (Xu, 1987).



*Figure 15 Outdoor public space in Low-rise housing*

### **3. Social Interaction in Chinese Traditional Housing**

In traditional Chinese housing, especially in famous traditional building, such as Beijing Courtyard house, Fujian Tulou dwellings, residents have much closer relationship and frequent communication with each other, compared with modern high-rise residential housing.

#### **3.1 People**

People living in one Courtyard house or Tulou mostly come from one family, or they have similar backgrounds and works, it is easier for them to build great connections with each other. Besides that, the open courtyard in the center of the house is the core to promote residents to get together. (Ye Ma, 2012)

In traditional society, because the social security system was not completed, and people or families had lower abilities of living, cooperation was the most specific and necessary way to get rid of living crisis, such as people always exchange product tools, get financial benefits from each other. In this situation, cooperation among different families promoted social interaction, as time went by, that became a kind of traditional culture in Chinese neighborhoods. (Hongyun, 2006)

#### **3.2 Public space, semi-public space, semi-private space and private space**

In traditional Chinese housing, either Beijing Courtyard House or Fujian Tulou, there is a central courtyard in the axle wire of the house, and all the private residential areas surround the central courtyard, which can promote people's social interaction. Before entering everyone's own private space from the outside, residents must go through four tier-space firstly, including street (public space), alley (semi-public space), courtyard (semi-public space or semi-private space), and private living room (private). In this way, residents would have experience from public space,

semi-public, then semi-private space and private space. Overall, there is enough open space for people to do communication and activities before they enter their room, and also it would not have a negative influence on their privacy, that is the core for people's social interaction achievement in Chinese traditional housing. Next, the size of courtyard housing is suitable, and residents feel neither hollowness nor suppression. Finally, the courtyard has multiple functions, and people can chat, walk, enjoy sunshine within the courtyard, that improve people's sense of belonging and promote social interaction. (Hongyun, 2006)

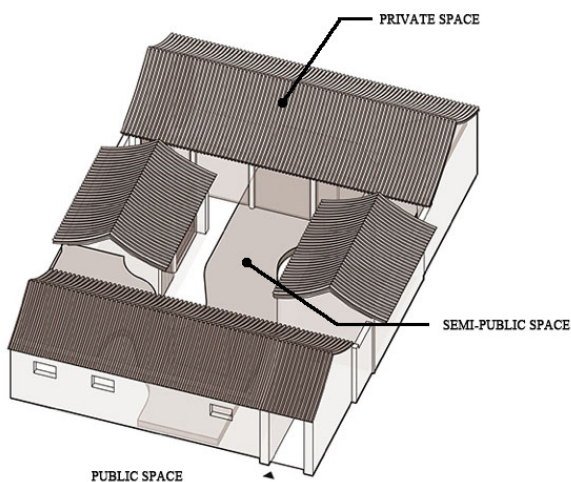


Figure 17 Traditional Chinese housing Beijing Courtyard House different spaces

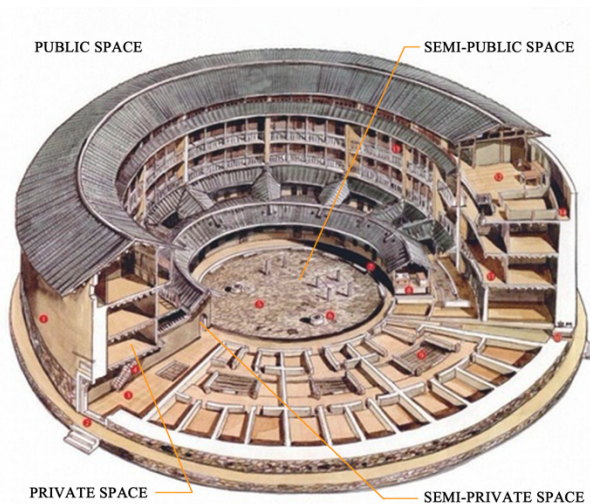


Figure 16 Traditional Chinese housing Tulou different spaces



Figure 18 Chinese Courtyard Housing under Socialist Market Economy



In the past, the private living tools and infrastructure are pretty poor, so that residents need go to shared equipment or room to do necessary activities, then they will have effective communication with each other. Some public functional place in traditional housing has important impact on residents' social interaction, for example, a well. Residents always wash vegetables and clothes together surrounding the well, the space surrounding the well becomes a common space for people to gather and communicate with each other. Other elements like well have similar phenomenon in Chinese traditional housing, such as an old tree, a millstone. (Song, 2004)



Figure 19 People's social interaction surrounding well

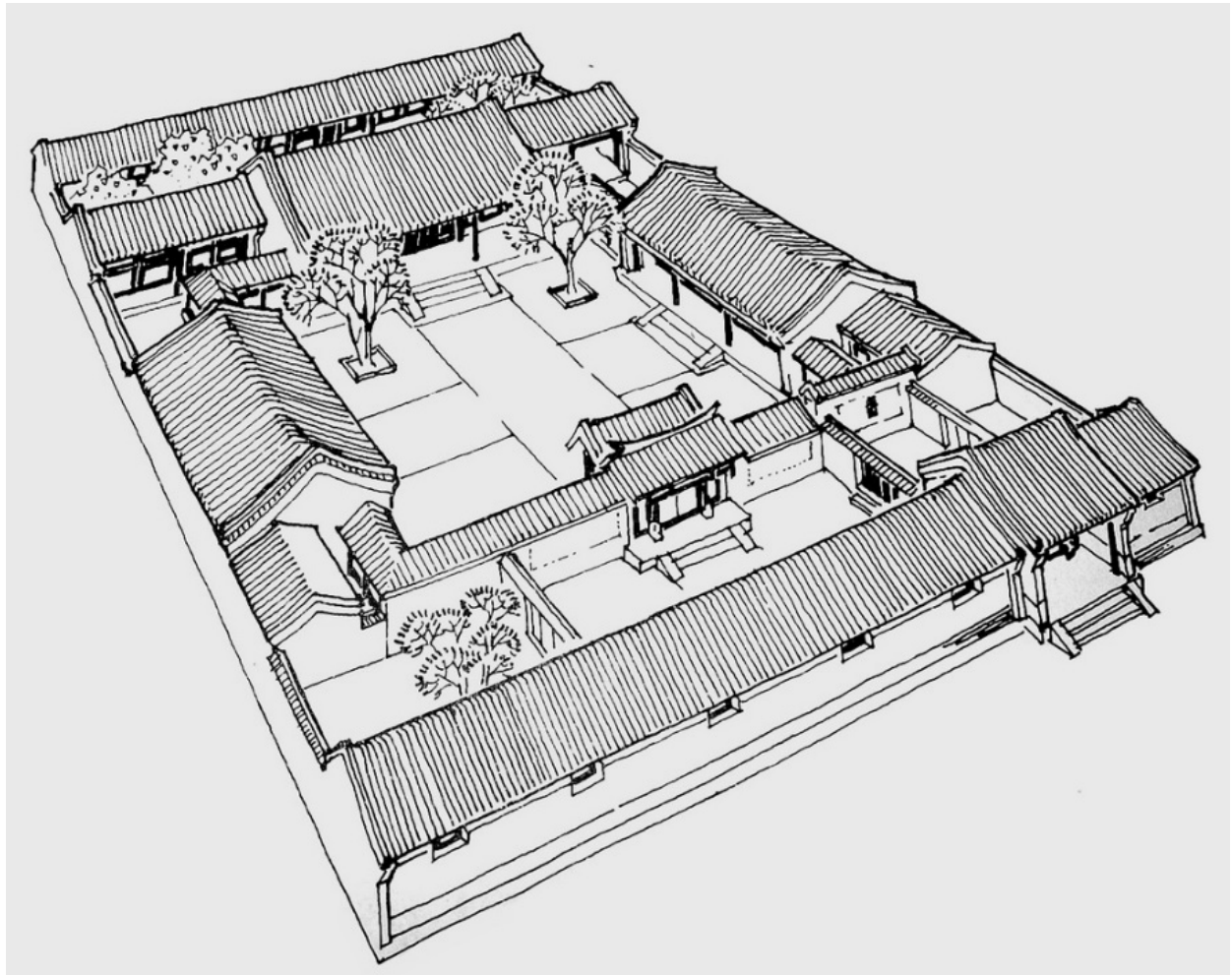
### 3.3 Influence from western world

From the influence of American urban planning in the 1930s, Hutong, Linong appeared based on this background. The size of Hutong is only suitable for pedestrian rather than vehicles, which helps improve the relationship between person and person, person and buildings, and increasing opportunities for social interaction. Furthermore, the alleys are much quieter than outside city roads, that also provides safety and a better environment for residents. (Liu J. , 2013)



#### 4. Change of Chinese residential housing

In the past, in northern China, the most common residential dwelling in Beijing is Courtyard house, which has already developed over 700 years. There may be over three generations in a single-family living in one courtyard house, the oldest family member lives in the northern house, facing the south. Moreover, there is at least one courtyard in the middle of the house, surrounded by other residential rooms and functional rooms. (Ekblad, 1990)

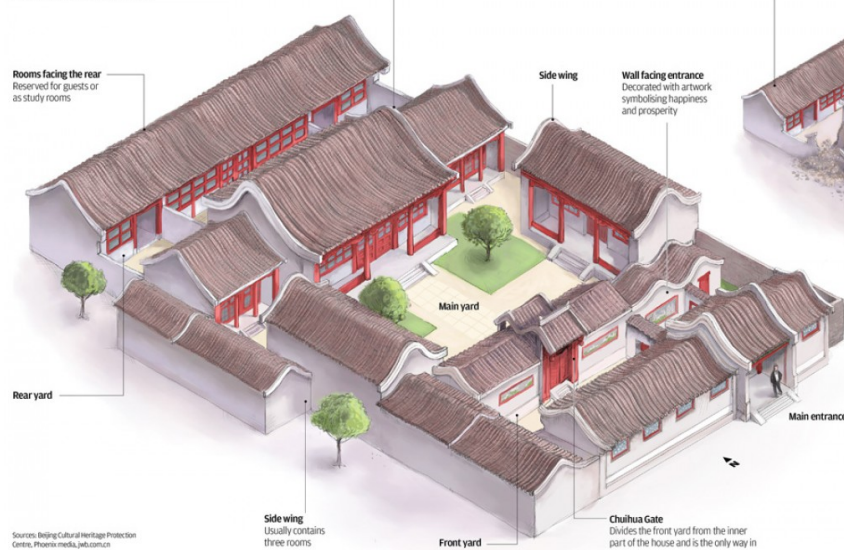


*Figure 20 Siheyuan Culture, Beijing courtyard house*

After 1949, a large number of the courtyard houses was abandoned and demolished because property developers and governments thought this kind of housing occupied a lot of land in city center but housed few people.

### Original layout

Liang Sicheng and Lin Huiyin, two of the most famous Chinese architects of the 20th century, spent seven years at 24 Beizonglu Hutong. Until 20 years ago, the building was a perfectly preserved example of a traditional *siheyuan* courtyard house.



Sources: Beijing Cultural Heritage Protection Centre, Phoenix media, jielu.com.cn

### Before demolition



Figure 21 The demolition of a traditional *siheyuan* courtyard house in Beijing

In the 1950s, because of influence from Russian architecture and urban planning, the main style and form of Chinese common residential buildings are Tube-shaped apartment buildings. While the central courtyard space in traditional housing was replaced by open “in-between” space which can directly be accessed from the street. Besides that, at that moment, this type of residential buildings constructed by government or companies, then the company assigned apartments for employees. People living in one building need to share kitchen and restrooms, children can play together in the public space, old people are living next to their children. People had a good relationship and social interaction everyday with each other though the living environment was not good enough. (Qin L. , 2018)





*Figure 22 Tube-shaped apartment buildings in China*



*Figure 23 People's life in Tube-shaped apartment buildings*



*Figure 24 People's life in Tube-shaped apartment buildings*

From the 1970s to now, the middle and high-rise buildings became the primary residential housing in China, especially in urban areas, in order to solve the problem of the enormous population as much as possible. The old Tube-shaped apartment building became dangerous due to its simple and unsafe structure as well as old-fashioned construction materials. Therefore, this kind of residential housing in urban areas were demolished since 1980s (Qin L. , 2018). During the period, from 1978, there was a high-rise building boom in some cities of China, and high-rise units occupy around 50% in the great cities of China. (Ekblad, 1990)



## 5. People's attitudes about social interaction in Chinese high-rise buildings

Except those people who are pursuing detachment and independent in their lives, currently, a group of residents in high-rise buildings, have realized that social interaction is necessary for themselves so that they cannot stand living the container high-rise building without robust infrastructure and public spaces anymore, result in they move out from the premises which mainly built in the past 30 years. After that, the left container high-rise building become empty and lack of maintenance, but it could not be demolished easily, which is also wasting materials and resources (Jian, 2012). From some cases, in northern areas of China, some residents would like to actively invite and organize their neighbors to have social activities together, for example, residents in one community have dinner together in the corridor to celebrate Chinese spring Festival, everyone is willing to attend the party and pay for that event (Newspaper N. , 2015).



Figure 25 High-rise residential building became Slumdog

## Methodology

The key is to explore if Chinese residents in high-rise residential housing still necessarily need social interaction with each other in the real world, actively or passively. According to previous research, social interaction in residential buildings, especially in high-rise residential housing, is gravely essential in people's life and social development, however, Chinese people's own opinions about that is more critical to achieve successful social interaction among neighbors. This society problem can be solved if resident themselves really are willing to have more social interaction firstly. Hence, based on Problem Statement and Literature Review, a questionnaire including the investigation process is proposed to collect residents' perspectives, then gather these answers, followed by analyzing these collected answers to conclude.

The questionnaire includes people's background information, the performance of living style and social interaction, expectation about design for social interaction improvement, as well as understanding about the edge between privacy and public.

The survey mostly made in great cities of China, people in these high-dense areas have more indifferent and complicated social problems than suburban or rural areas (KIM PARKER, 2018). For example, in China, today, around 168 million people are renting apartments in Chinese great cities (Zhidaao, 2018), most of them come from other different cities. However, they hardly have stable credibility with each other in same building, but they suffer from more pressure and might more need help and emotional communications with their neighbors.

Through analysis of the questionnaire, the data would indicate people have various levels of need and requirement of social interaction in high-rise buildings, and it might have promotion for future high-rise buildings development.

# Questionnaire

## Part I

First Part of the questionnaire is background information investigation.

### **Question 1: Age:**

**Choices: a) 15-18, b) 19-30, c) 31-55, d) Over 55**

This question is a basic information about participants' experience in society, due to different aged people might have different understandings of social interaction and performances about living conditions. The choices have four parts, 15 to 18 years are children and students, 19 to 30 are young people or young couples with young kids, 31-55 are middle-aged people already having complete relationships with others in society, over 55 are old people.

### **Question 2: Education Background:**

**Choices: a) High School, b) Undergraduate, c) Graduated, d) PhD**

This question is a survey about participants' educational level, currently most people have educational background more than high school in China. Probably people have different educational level might have different social needs and requirements (Campbell, 2006).

### **Question 3: Current living structure:**

**Choices: a) Single, b) Couples with children, c) Couples without children, d) Home sharing, e) Others**

This question is a survey about participants' current family living situation, people in various family formations have their own highlights in social interaction with others.

**Question 4: What's your housing style:**

**Choices: a) Own a house or an apartment, b) Rent a house or an apartment**

This question is about if participants are living in a rental house or in their own house. People, from other cities or just graduated from university, initially living in great cities prefer to rent a house or an apartment rather than buy a house because of their preference and economic capability. From previous research, people living in rental house do not have much creditability and background, sometimes they might be isolated by others in the same residential building, but they do need help and more social work with their neighbors. This question designed to verify this group of residents' attitudes towards social interaction and their social situation.

**Question 5: What kind of housing are you living now?**

**Choices: a) Single-family house, b) Multi-story building**

This question is about participants' current living way. It is designed to distinguish people in different kinds of residential buildings may have different level of social interaction with others. For example, people choose to live in single-family house probably means they pursue detachment and think little of public living in their residential areas (Bibey, n.d.). There are much bigger private space and semi-private space rather than public space in single-family house compared with multi-story buildings, that could be another element impact people's social interaction.



**Question 6: What type of housing are you living if you are living in multi-story building?**

**Choices: a) Low-rise building, (5 stories or less)**

**b) Mid-rise building, (around 15 stories)**

**c) high-rise building, (around 20 stories or more)**

This question is about participants' current type of living style and the proportions of different types in China now. The question is designed to recognize that if there is stronger or weaker social interaction between residents in high-rise buildings compared with low and mid-rise buildings. And low-rise, mid-rise and high-rise have different vertical circulation ways, which might have influence on people's social interaction (Xu, 1987). Stairs is more popular in low and mid-rise buildings, while elevator is the main circulation way for people in high-rise buildings. Compared with elevators, people stay much more time on stairs before they get to their destinations, and they feel safer and stable on the stairs

## **Part II**

Second Part of the questionnaire is relevant to participants' social interaction with their neighbors in current residential housing

**Question 7: How many neighbors do you know in your building?**

**Choices: a) Less than 10%, b) Around 30%, c) Around 50%, d) More than 50%**

This question is asking if they do know part of their neighbors. The statistics will indicate people's connections with their neighbors and show if the social problem really exists in current residential building or community compared with past decades.

**Question 8: Do you have social interaction with you neighbors? (such as greetings when you meet, chatting for a while, playing, or helping each other)**

**Choices: a) Yes, b) No**

This “Yes or no” question is aimed to investigate if Chinese people have any kind of social work with others in residential building, informally or formally. If they do have any kind of social interaction with others, the following question ask their understanding about social interaction. And it can indicate some of the reasons about what kind of elements will impact people’s preference of social interaction after compare the result of this question with other questions.

**Question 9: If you have communication with neighbors before, what kinds of social interaction do you have with your neighbors? If you do not have, skip this question**

**Choices: a) Just know, b) Greetings, c) Chatting, d) Playing, e) Helping, f) Being friends**

The question is to see how people treat social interaction with their neighbors currently and how depth of the connections between them and their neighbors. And from analyzing the result to figure out the trend of relationship among neighbors.

**Question 10: If you know your neighbors, how do you know your neighbors? If you do not know neighbors, skip this question**

**Choices: a) Short greetings when you meet, b) During playing with children, c) Internet, d) Walking dogs, e) Solve neighborhood problems, f) Doing exercise, g) Having public activities, h) Others**

The open question is asking how people know their neighbors, that would have positive influence for future community improvement in order to build harmonious residential environment.

And also, the result of this question would show if residents are willing to have social work with neighbors actively.

**Question 11: Do you think social interaction is important in residential building?**

**Choices: a) Yes, b) No**

This question is directly to ask people's attitudes about social interaction with their neighbors. People's opinion is one of the key aspects about re-building credibility and relationship among residents. And see if people have realized they need social interaction or not with neighbors in their lives.

**Question 12: Do you think the public space or semi-public space in your residential buildings is designed well for social interaction?**

**Choices: a) Yes, b) No**

From Literature Review, not well-designed inside and outside public space probably has pretty negative impact on residents' social interaction in China. Some huge public space without careful design is occupied by vehicles, moreover, inside semi-public space is only used as circulation area rather than social area. This question aimed to investigate if "public space issue", which is one of the most harmful for social interaction, is common or not in Chinese residential housing.

**Question 13: Do you think the social interactions between neighbors in your high-rise buildings or community is good or not?**

**a) Good**

**b) Not good, your opinion about the reason:**

The open question is to collect people's own thoughts, might out of pervious research, about social interaction lack in current Chinese high-rise buildings

### **Part III**

Third part of the questionnaire focuses on people's expectation and preference about living style and social interaction in High-rise housing. And the analysis of this part would be helpful for social improvement in the future.

**Question 14: Do you like living in High-rise buildings in urban areas?**

**Choices: a) Yes, b) No**

The question is asking people's preferences of housing in a high-dense area. People who wants to live in single-family house prefer detachment and independent in their own life, while people who would like to live in multi-story building might pursue sense of being group and chances of social interaction with others.

**Question 15: If you live in a high-rise building, what range of levels do you want to live?**

**Choices: a) 1-6, 2) 7-20, e) over 20**

The question is asking people's preferences of floors when they live in high-rise housing. 1-6 floors are lower levels, 7-20 floors are defined as middle level, over 20 floors are higher level.

From people's preference of selecting living level, living in higher level would provide privacy as much as resident's expectation, and crimes also happened on ground or lower levels, while people prefer to living on lower level can save a lot of time on waiting for elevators but cannot enjoy great view as well as lighting and ventilation (LendingTree, 2017).

**Question 16: What are your selection criteria when you choose a living housing? (rank the choices)**

**Choices: a) Building Orientation, b) Level, c) Area of public space and semi-public space, d) Area of private space, e) Level of Safety, f) Environment, g) Infrastructure, h) Location**

This question is to investigate people's main concern about critical elements while they are choosing ideal housing. It can show which aspect is the most critical point that people consider.

**Question 17: Are you feeling uncomfortable when you share your personal information with your neighbors?**

**Choices: a) Yes, b) No**

From Literature Review, nowadays, people living in same building mostly have different backgrounds and educational level, they probably even do not know each other before living in this building but they have to live close to each other because the structure of current residential building.

**Question 18: Do you think having social interaction activities inside the high-rise building would impact privacy?**

**Choices: a) Yes, b) No**

From Literature Review, people become more and more independent today, and they increasingly pay attention to their privacy, especially when they are living in grouped living units building. Probably having social interaction with neighbors in front of their front door or in the semi-public spaces partly impacts their privacy,

**Question 19: if you have same budget, which one of the following will you select?**

**Choices: a) Big private living area with small public space in the building,**

**b) Small private living area with big public space in the building**

This question is also aimed at people's preference when they decide their ideal housing. People pursue big private living area but small public space might indicate that they more enjoy living independently and already have their own social circle outside the building. Selecting small private living area with big public space might indicate that people more concern about the communication with others in the same residential area.

**Question 20: Will you do any social interaction with others in public infrastructure (such as gym, old people activities, club) in the residential community?**

**Choices: a) Yes, b) No**

This question is asking if people are willing to do any social work with their neighbors when the building provide such public places. In some research, there are public fitness center and club

provided in the community, but residents never use that since they live in the community, or they do not have any social interaction with others while they are staying in that infrastructure.

**Question 21: Will you do any social interaction with neighbors in elevator?**

**Choices: a) Yes, b) No**

Elevator, as the most primary circulation transportation in high-rise buildings, creates a lot of chances of social interaction for residents, however, from the above research, elevator car is not a good enough place for people to have social work. This question is to investigate people's ideas about social in the elevator.

**Question 22: How often will you spend your time on outdoor activities?**

**Choices: a) Never, b) Sometimes, c) Frequently**

Social interaction might impact by frequency of outdoor activities. This question is to investigate how much time and how often do people spend staying outside.

## Result Analysis

The questionnaire assigned on April, 2019 in China through a Chinese questionnaire website, and finished data collection on June, 2019. There are 227 participants joining the survey, and successfully collect 185 effective questionnaires.

### A. Single Question Analysis

#### Part I Background Survey

##### *Question 1: Participants' age range:*

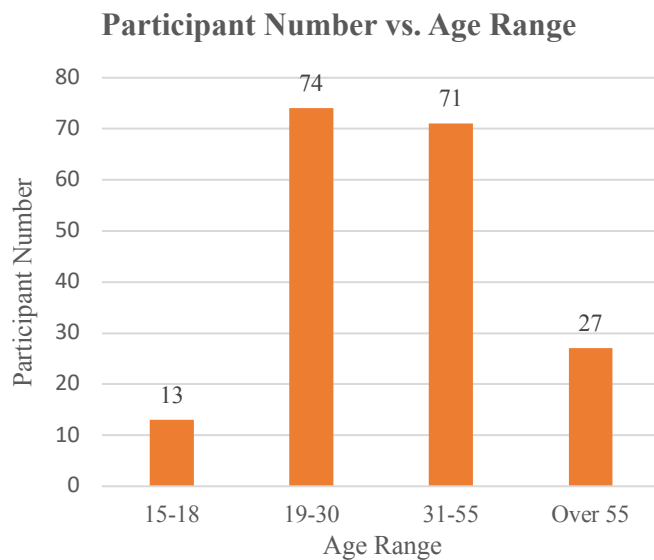


Chart 1: Participant aged number

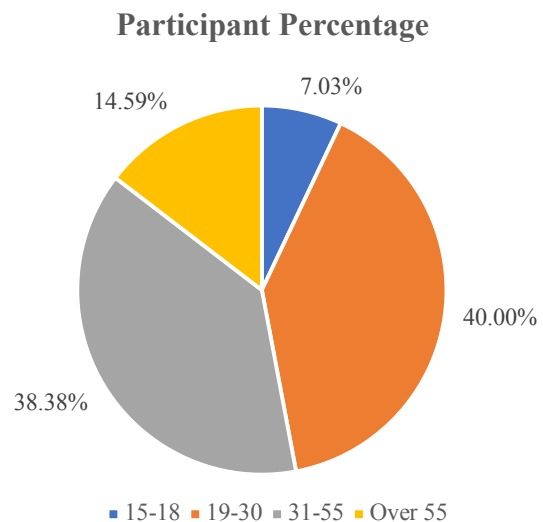


Chart 2: Participant aged percentage

There are 185 participants from great Chinese cities successfully submitting their completed questionnaires. Among the 185 participants, 13 of them aged from 15 to 18, who are currently middle school or high school students, and 74 of them aged from 19 to 30, and 71 of them are aged 31 to 55, while 27 of them are aged over 55. Form Figure 2, the teenager and mid-age people make up with the most significant amount of participants in this survey.



### ***Question 2: Participants' education background***

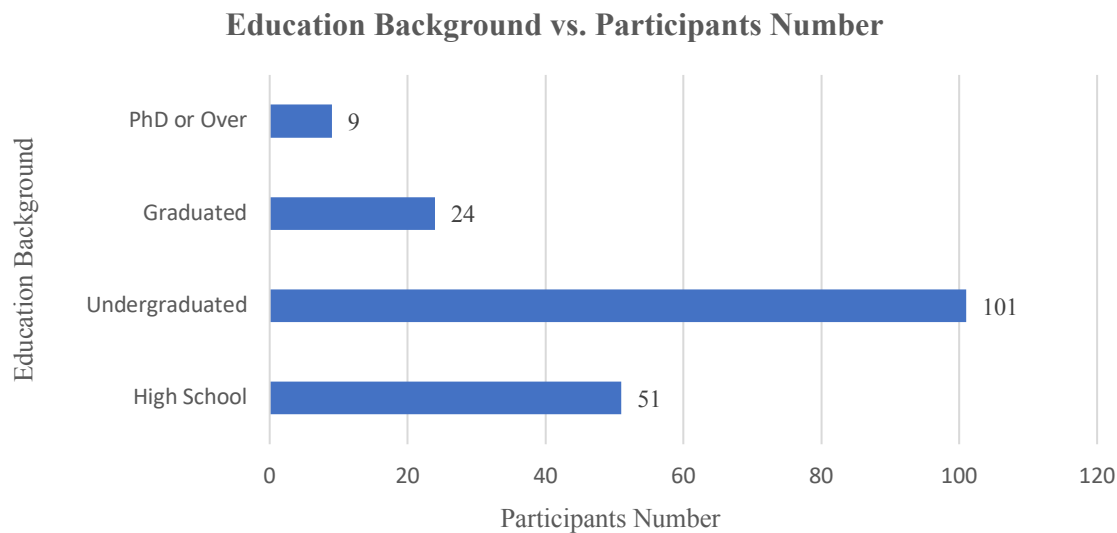


Chart 3: number of Participants' education background

From the above chart, the majority of the 185 participants have an undergraduate degree, 51 of them did not go to university, 24 participants have obtained a master degree in their fields, and 9 of them get Ph.D. or over degree.

### ***Question 3: Current living structure***

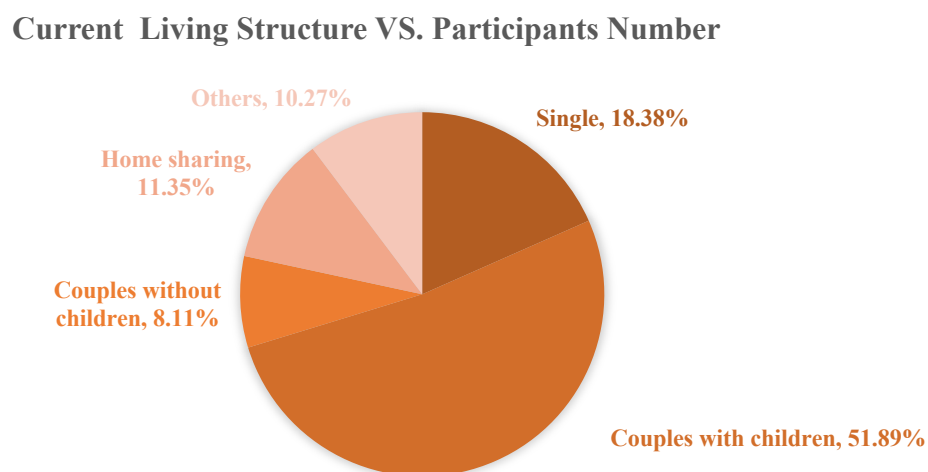


Chart 4: Percentage of participants' current living structure

In this survey, person living with himself or herself occupies around 18% of total participants, couples with children occupies approximately 52%, while couples without children occupies 8.11% of total, and 11.35% of all participants choose home sharing currently, as well as the rest of participants, have their living structure out of the above four ways.

#### ***Question 4: Housing Style***

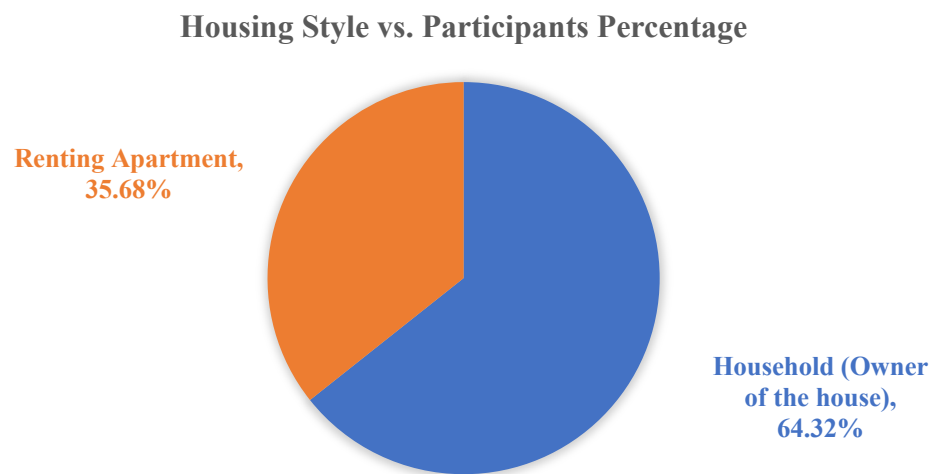


Chart 5: Percentage of participants' current housing styles

Form the chart, and most participants are householders in this survey. By the contract, around 35% of total participants are still renting apartments or house for living, which is a significant percentage, that is to say, rental housing is not an unusual phenomenon in current China. From the report, about 245 millions of people, which is one-sixth of the total Chinese population, do not settle down in China (Newspaper G. D., 2015), since they leave for great cities to look for better working opportunities, education, environment, and life qualities. However, it is different for them to buy an apartment in these areas at the beginning. Therefore, rental housing is the primary way to stay in such cities.

***Question 5: What kind of housing are you living now***

Between the choices of the single-family house and multi-story residential building, in the total 185 participants' result, 32 people are living in a single-family house, which occupies 17.3% of full participants, while 153 people are living in multi-story buildings. The single-family residence is much more experience than multi-story housing now, especially in great cities of China, for example, the price of a typical single-family house in Chengdu is around 3000 USD per square meter (Chinese House is Selling in Chengdu, China, 2015), it is not easy for an ordinary employee to afford a single-family house in high-dense areas in China so that people pervasively live in multi-story buildings in urban areas even though most of them still need to apply loan to buy a standard apartment.

***Question 6: What type of housing are you living if you are living in multi-story building***

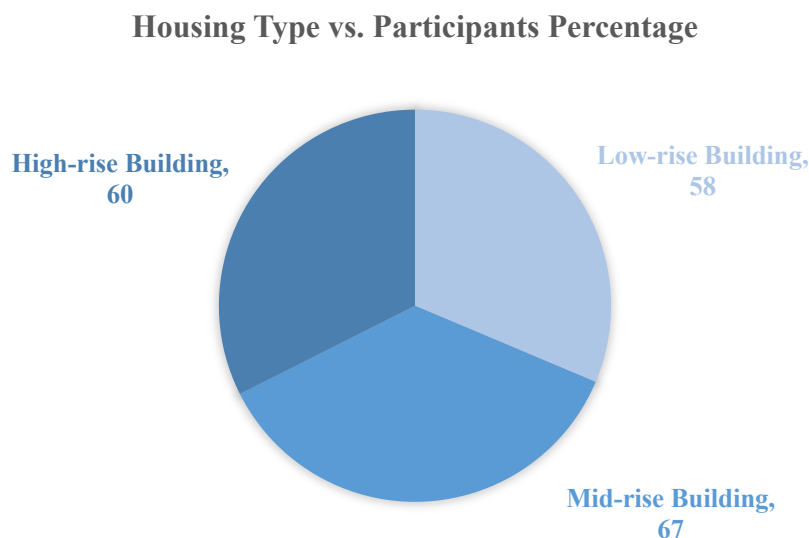


Chart 6: Percentage of participants' current housing types in multi-story building

Under current Chinese urban development and living preference, the numbers of people who are living in low-rise, mid-rise or high-rise buildings are approximately equal to each other.

## Part II

### ***Question 7: How many neighbors do you know in your living building?***

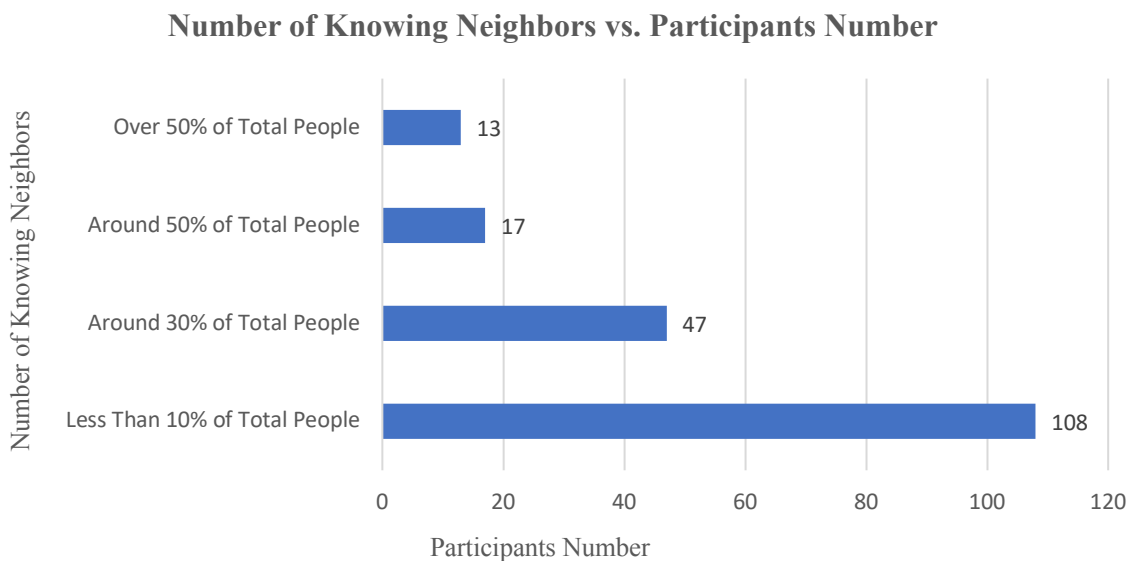


Chart 7: Numbers of participants' known neighbors

### **Number of Knowing Neighbors vs. Participants Percentage**

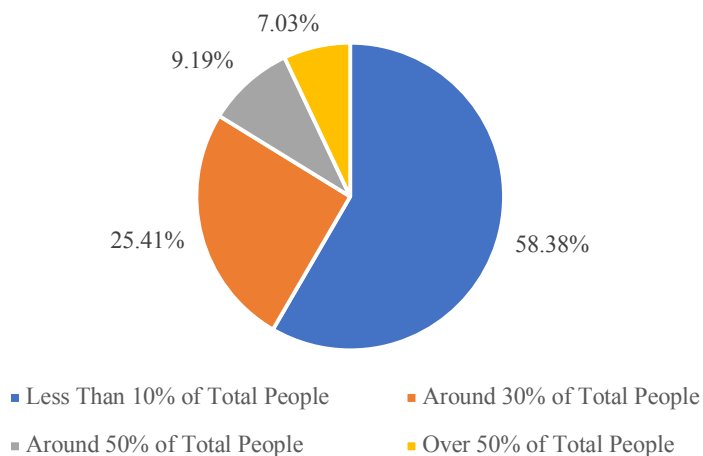


Chart 8: Percentage of participants' known neighbors

The two charts show that in the 185 participants, 108 of them, which over 55% of all participants, know less than 10% of total neighbors in the same community or residential building, only 13 participants say that they know or have a conversation with more than 50% of their entire

neighbors. That would be a severe social problem in current Chinese residential society compared with traditional housing. People in the past knew each other and regarded helping each other as their duty. However, now, in some luxury residential community, community managers and designers pay more attention to how to protect residents' safety and privacy, that lead to residents are isolated by private elevator and smart door lock. People even have no idea about who is living next to them, even in some cases, residents only recognize the people who are living on the same floor with them.

***Question 8: Do you have social interaction with you neighbors? (such as greetings when you meet, chatting for a while, playing, or helping each other)***

**If People Have Social Interaction with Neighbors**

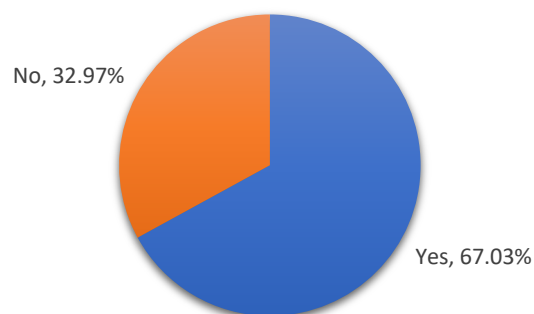


Chart 9: Percentage of if participants have social interaction with neighbors

Based on the result, the number of 124 people, which around 67% of all participants, acknowledge that they have social interaction with their neighbors in their daily life. That indicates that probably two-thirds of people have realized that they have social interaction need with their neighbors; they are not just satisfied with living in the existing building without communication with others. Consequently, near 33% of people never have social interaction with neighbors; they almost spend all their free time at home, and keep silence when they meet neighbors in the elevator.

As said in Literature Review, social interaction plays an essential role in private lives, which can promote people's individual development and improve the level of safety in the building, however, the fact that one third of people did not have social interaction with neighbors would cause their unhealthy development and a series of social problems.

***Question 9: If you have communication with neighbors before, what kinds of social interaction do you have with your neighbors? If you do not have, skip this question***

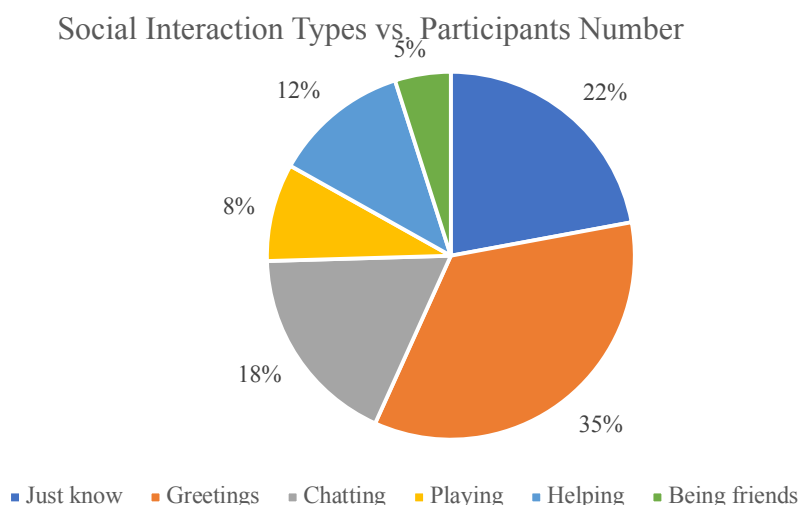


Chart 10: Percentage of participants' interaction types

In this multi-choice survey, from “Just know” to “Being friends” is a progressive process, a significant number of participants have greetings to their neighbors in their daily life, while there are also many people just knowing their neighbors, and fewer people building a friendship with their neighbors. It seems like that it is not common for Chinese residents to have more stable and deeper relationships, such as playing and being friends, with neighbors nowadays due to the trust problem and public space problem from Literature review. Even though people have social interaction, most of the interaction is weak and casual, and people hardly have more in-depth communication with others.



***Question 10: If you know your neighbors, how do you know your neighbors? If you do not know neighbors, skip this question***

**TYPES OF KNOWING NEIGHBORS VS. PARTICIPANTS PERCENTAGE**

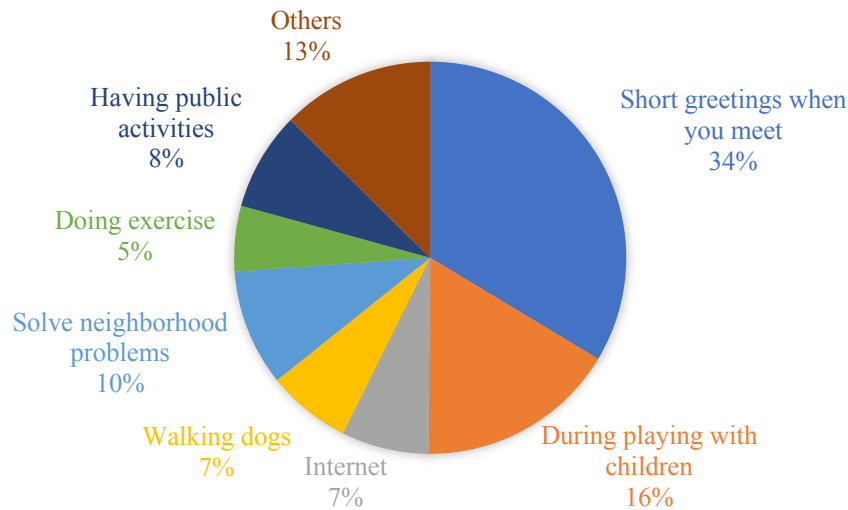


Chart 11: Percentage of types of how participants knowing neighbors

Form the pie chart, short greetings and playing with children are the two primary ways for residents to know their neighbors, in the future high-rise buildings' development, adding more children playground court and more communication place areas can be an effective way to create more social chances. Moreover, in the literature review, a study says that today people hardly help each other due to social development, however, from the result, numbers of people are still willing to help their neighbors in modern society, which leads to significant social interaction.

***Question 11: Do you think social interaction is important in residential building?***

In the 185 participants, 148 of them which occupies 80% of total consider that social interaction with neighbors is quite crucial in residential buildings. They do understand the positive impact of social interaction on themselves, their children, and older people. However, the rest 20%

of total participants think social interaction in the neighborhood can be ignored, and they can concentrate on their own lives.

***Question 12: Do you think the public space or semi-public space in your residential buildings is designed well for social interaction?***

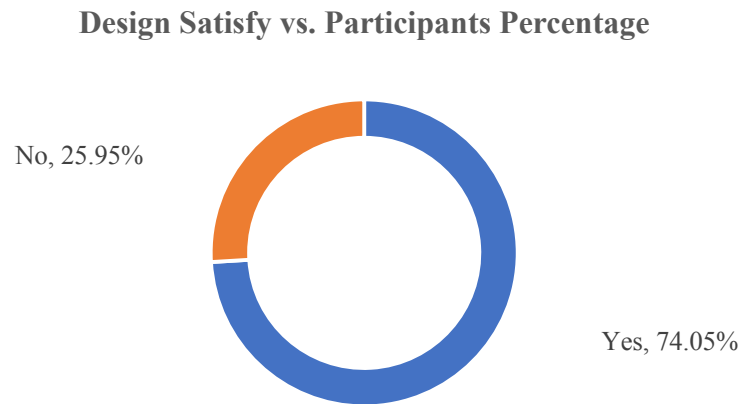


Chart 12: Percentage of if participants feel satisfied with public spaces

The result shows that 148 participants (74% of total participants) deem that the public or semi-public spaces in their current residential housing are well-designed to improve social interaction in neighborhood. They can have social interaction in the elevator lobby, outside community garden, or corridors without distraction and uncomfortable. Also, the Chinese government has published policies to stipulate the minimum area and ratio of public spaces and green spaces should be considered and constructed in a new residential community (China, 2014), that is to improve more healthy lives and promote social interaction among Chinese residents. By the contract, around 26% of total participants acknowledge that the public or semi-public spaces in their community is not good enough for needed social interaction. Like said in Literature Review, the kind of public space and semi-public space are old, narrow and out of managed, residents are not willing to stay in such areas for a while, which reduces opportunities of social interaction.

***Question 13: Do you think the social interactions between neighbors in your high-rise buildings or community is good or not??***

Over 60% of participants acknowledge that the social interaction in their community is not good and give their personal ideas about the reason. After statistics, the following statements mainly proposed by participants.

1. Young people are busy with their work during the main daytime, and then after the whole-day work, they barely have energy and time to have social interaction with neighbors. Instead, they prefer to spend their free time with family members or friends.

2. It is hard for people to build trust credibility with new neighbors in the same building because they have different backgrounds and come from different places. Sometimes, they do not know each other when they move to a new location.

3. With technology development, people increasingly would like to communicate with each other by phone or computer, and they are losing the ability to have a conversation by face to face.

4. Public spaces and semi-public spaces barely have clear divided and organized, when children, teenagers, and older people use the same place at the same time, it is too chaos to have sufficient social interaction. Furthermore, in some cases, public space is regarded as a parking lot, and the semi-public area is harmful to people's privacy.

5. There is no public activity held in the community, and some people do not like to communicate with others actively.

6. The elevator is the primary circulation method. People living on higher levels in a high-rise building consider going downstairs is inconvenient.

Part III

**Question 14: Do you like living in High-rise buildings in urban areas?**

There are 112 participants (60.5% of total) express they are willing to live in high-rise buildings in an urban area, while 74 people dislike living in high-rise housing. From the literature review, high-rise housing has been the most significant housing way in the high-dense area in China. So far in this survey, it shows more people agree to live in high-rise housing, because of that, with urban development, to accommodate the sustain increasing urban population, the number of high-rise buildings will not stop growing,

**Question 15: If you live in a high-rise building, what range of levels do you want to live?**

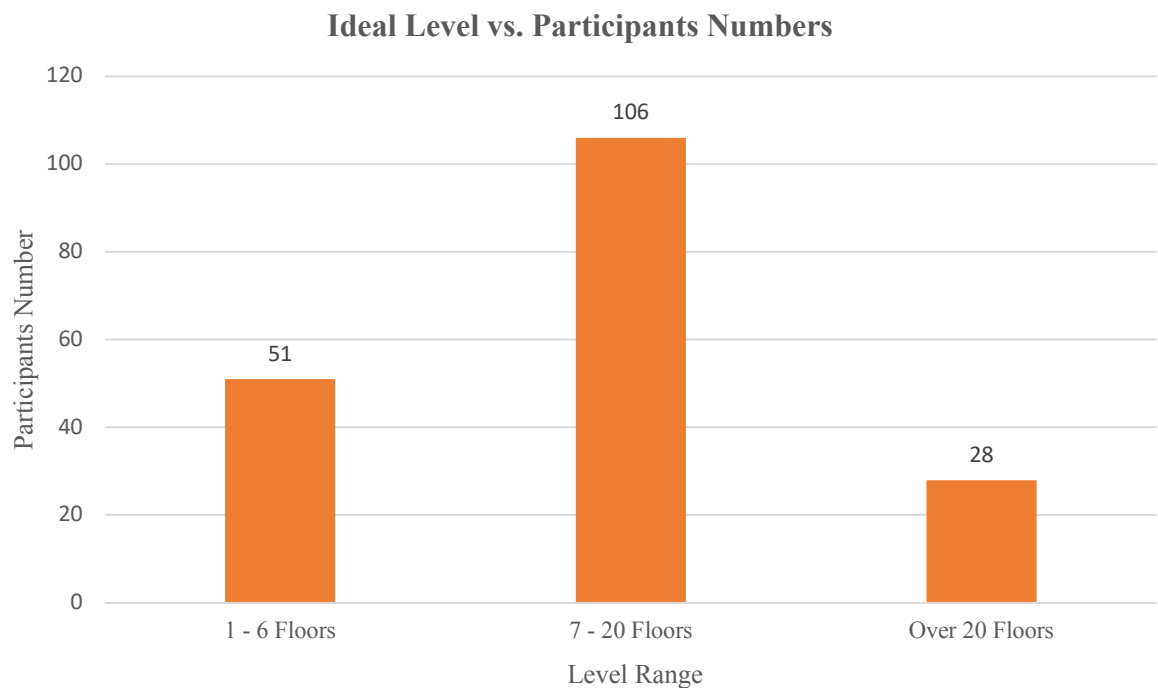


Chart 13: Numbers of participants' ideal living level

1-6 floors in a high-rise building can be defined as a lower level, 7-20 floors are middle level, and over 20 stories is higher-level. The above chart indicates that over half total participants prefer

to live on the intermediate level, which has better privacy and safety than the lower level, but less city view compared with higher concentration. In this question, there are 28 people choose higher level as their ideal level in a high-rise housing, it can understand that this group of people, about 15% of total, might have more interested in enjoying the best view as they expected and do not much care about social interaction with neighbors on ground floor.

***Question 16: What are your selection criteria when you choose a living housing? (sort the choices)***

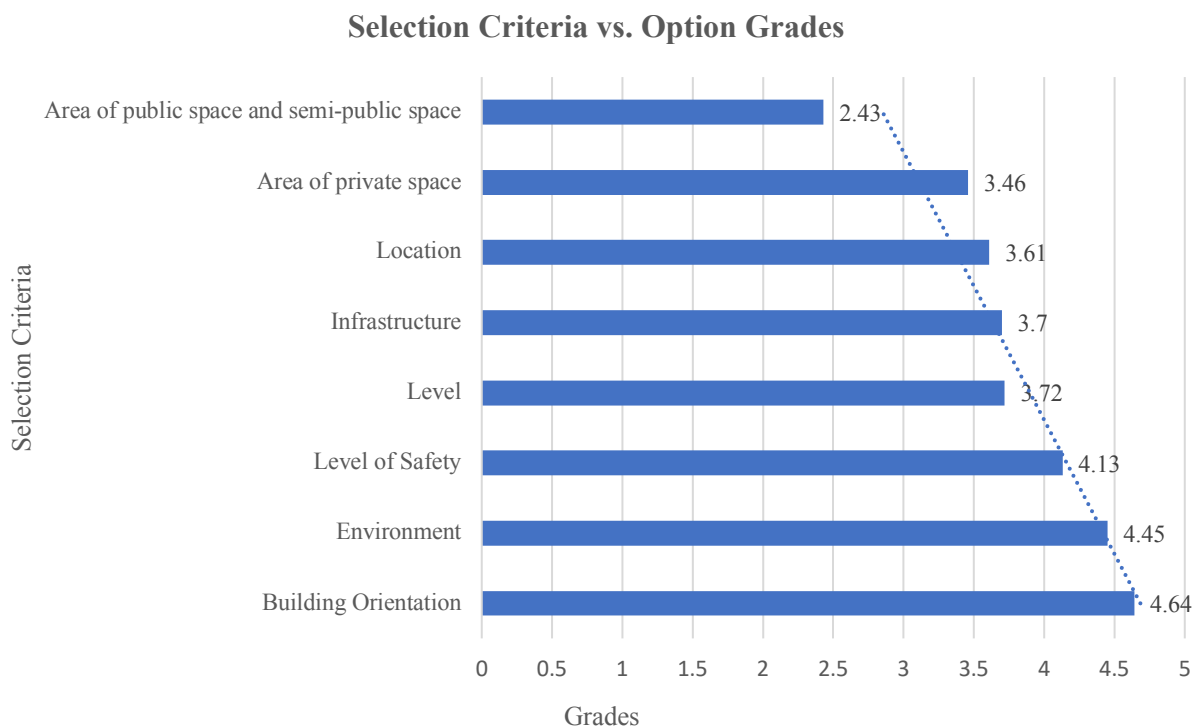


Chart 14: Result of sort the selection criteria from choosing a living housing

The chart illustrates that “Building orientation” is the most critical element needed to be considered when people choose their ideal housing, followed by “Environment” and “Safety” being voted as second and third positions in people’s mind, while “area of public and semi-public spaces” is the last aspect people concerned among the above all options. In the Literature Review,

a lot of research express that people have less social interaction in high-rise housing because of the terrible-designed and non-managed public spaces. However, people's perspective about requirement and need of public spaces is not as crucial as "private area" and "building location", the fact might reminder high-rise building developers paying less attention to design public spaces in the future, then this behavior will lead to open space in high-rise buildings become increasingly marginalized in the following high-rise housing development, finally, people would have less and less social interaction in residential area because of a few public spaces.

***Question 17: Are you feeling uncomfortable when you share your personal information with your neighbors?***

**If People Feel Uncomfortable When They Share Information With Neighbors**

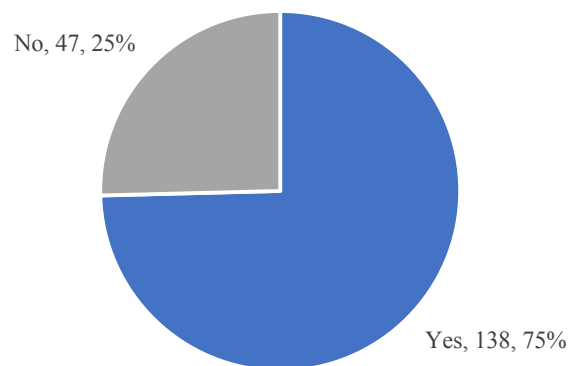


Chart 15: Percentage of participants' attitudes about sharing information with neighbors

The above chart tells that 75% of total participants will be uncomfortable when they say to their neighbors about their personal information, such as marriage situation, working salary, and background. This sense of nervous makes people avoid deeper social interaction with their neighbors, which also might reduce the possibility of building trust credibility with each other.



***Question 18: Do you think having social interaction activities in semi-public spaces inside the high-rise building would impact privacy?***

For this question, 115 participants, around 70% of total participants, think their privacies not infringed when they have social interaction in semi-public areas inside the high-rise housing. Most people yearn for effective social communication with neighbors, and they do not feel this kind of group activities would bother their own lives. Also, people's privacies can be protected well partly own to a sizeable semi-public space design which successfully divides the single living and free-living, physically and manually.

***Question 19: if you have same budget, which one of the following will you select?***

Between the Choice A “Big private area with small public and semi-public space” and the Choice B “Small private area with big public and semi-public space”, 86.49% of total participants (160 participants) choose the choice A, they are not interested in prominent public spaces, instead, they try to avoid that. Because according to Chinese domestic policy, Chinese residents need to pay part construction and a management fee of public space and inside semi-public spaces, the bigger public space they shared, the more extra money they need to afford <sup>1</sup>. Buying an apartment is not an easy thing in a lot of Chinese people's whole life (Shepard, How People In China Afford Their Outrageously Expensive Homes, 2016). Hence under this policy, people may have to spend more cost to buy an apartment with 70-year equity, so that people prefer to choose a regular sized apartment attached smaller public and semi-public spaces with lower management fee as their ideal housing. Then to get financial benefits, the residential developer will reduce the size of public space as much as possible in a proposed residential area, probably the area of public space meets

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<sup>1</sup> 1.2.2 Reason for narrow public space and semi-public space

the minimum requirement which required by the government. This trend creates that the smaller and poor-managed public space reduces people's interest in having social interaction, and it cannot give reliable protection for children as well in the future.

***Question 20: Will you do any social interaction with others in public infrastructure (such as gym, old people activities, and club) in the residential community?***

#### **If People Have Social Interaction In Public Infrastructure**

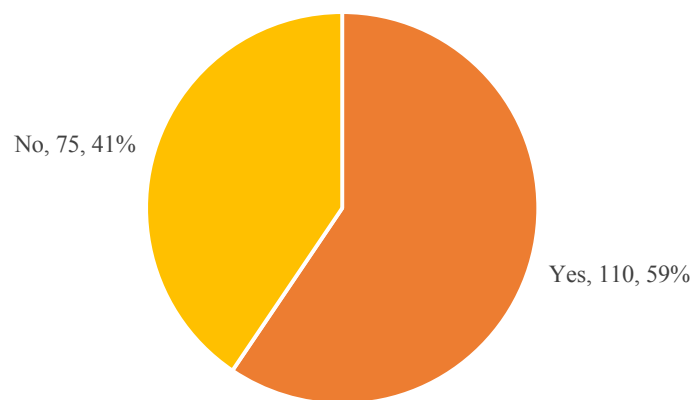


Chart 17: Percentage of participants' aspiration about having social interaction in public infrastructure

The result shows that 80% of people acknowledge that they do have social interaction in the public infrastructure provided by the community. It seems like public infrastructure, for instance, gym, playground and club, increase the opportunities of social interaction among residents, people may feel more natural and comfortable when they interact with others in such public activity site. Besides that, building public infrastructure is not only suitable for social interaction but also have a positive impact on people's health, public safety, information exchange, even education and employment (Infrastructure, 2012).

***Question 21: Will you do any social interaction with neighbors in elevator?***

**If People Have Social Interaction In Elevator**

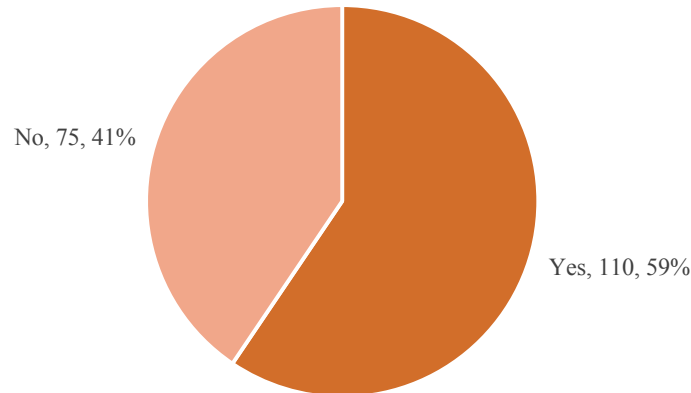


Chart 18: Percentage of participants' aspiration about having social interaction in elevator

The result of social interaction in the elevator is unexpected because the above study indicates that the elevator is not a suitable and comfortable place for residents in high-rise housing to have social interaction due to its characteristics. However, according to the questionnaire, in the 185 participants, now more people positively interact with others in the elevator car. Elevator, as the most primary circulation method in high-rise housing, probably will not be defined as a small case which not suitable for social interaction after well-designed. Furthermore, a bright elevator lobby with gentle air flow can strengthen people's aspiration of social interaction.

***Question 22: How often will you spend your time on outdoor activities during free time?***

The question is aimed to investigate the frequency of residents' outdoor activities, the less time people stay outside, the less chances of social interaction they create.

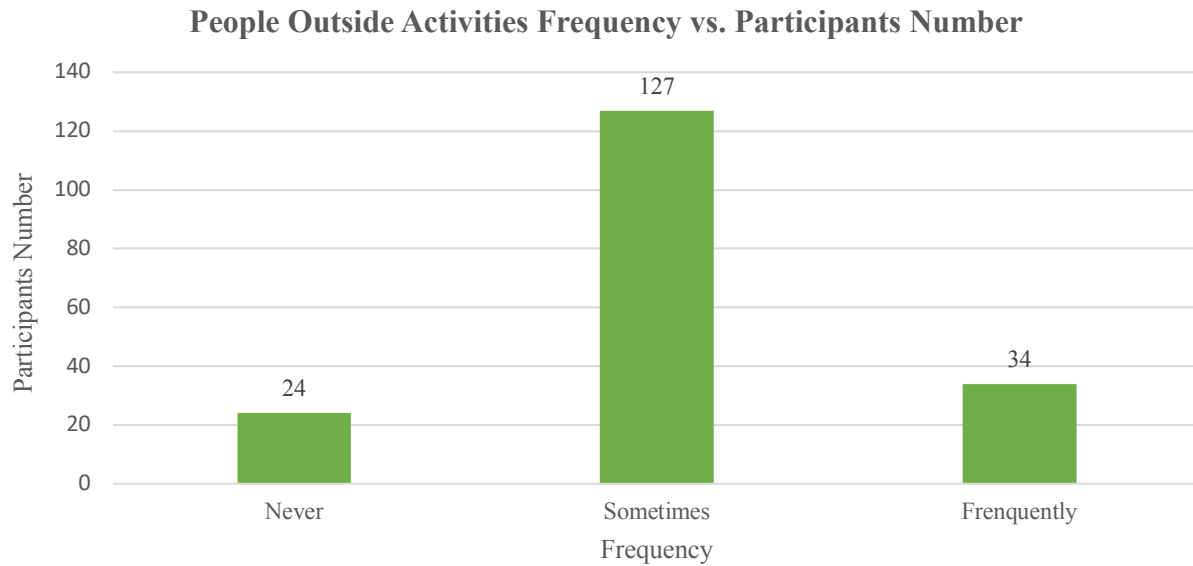


Chart 19: Numbers of participants' outside activities frequency

Among the “Never”, “Sometimes” and “Frequently”, the most participants say that they casually go outside for any activities, they spend more time on staying home alone or with family members when they are free rather than go outside and look for social interaction with other residents. Notably, the single circulation method in high-rise buildings makes people barely feel free to go downstairs then get out of the building. Consequently, people have less social interaction with neighbors compared with the past because they lessen the time and chances to meet and know each other in the same community or high-rise residential building.

## B. Comparison Question Analysis

Compare Q1 age range and Q4 housing style,

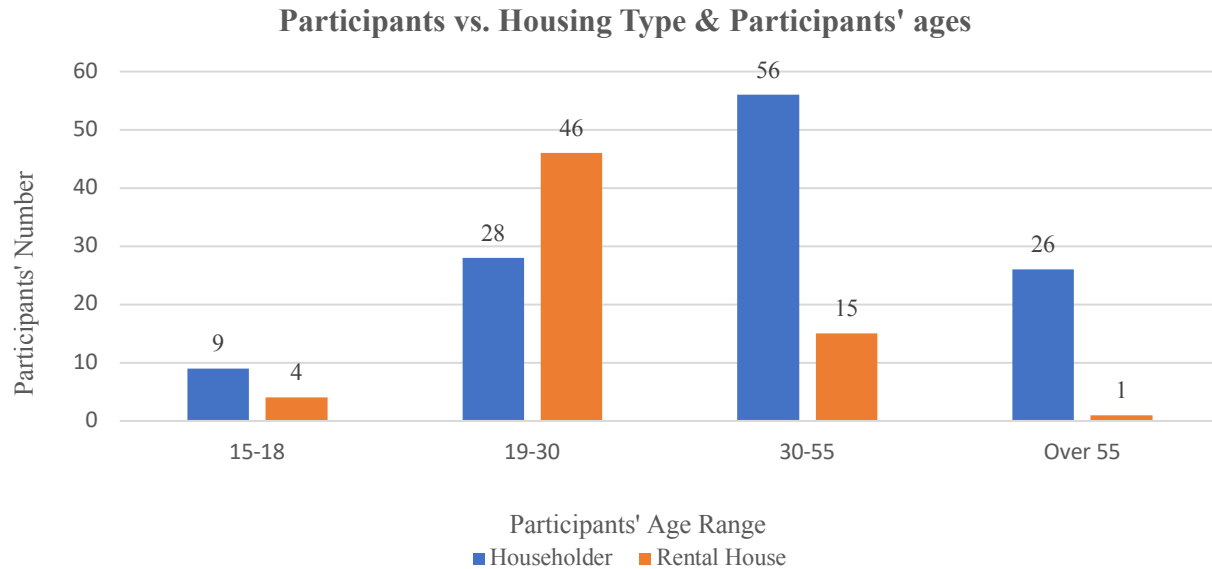


Chart 20: Comparison between participants' housing type and range age

From the chart, people aged from 30 to 55 and over 55 are mainly householders in China. This group of people already have their own family and children, at this time, a “stable residential housing” is necessary and required in Chinese people’s traditional principles so that they prefer to get their own house, as well as they also have the ability to afford that. While the majority of residents aged from 19 to 30 are renting an apartment for living, because probably now they are struggling with work and study during the phase, and most of them stay in a city tentatively, so the rental house is more flexible for them. Compared with adults, teenagers also partly become householders in China due to an unusual Chinese policy, Limited Purchasing Order published in 2010, which required that one identified Chinese citizen is limited to purchase only one house in most great Chinese cities (China.com.cn, 2012). Under this policy, some people buy an extra house in their children’s name for investment in the housing market to get benefits, which leads to some teenagers without purchasing power originally still have been householders in China.

Compare Q1 age range and Q7 numbers of knowing neighbors

	Age Range				
Numbers of Knowing Neighbors	15-18	19-30	30-55	Over 55	Total
Less Than 10% of Total Residents	2	47	48	11	108
Around 30% of Total Residents	3	20	15	9	47
Around 50% of Total Residents	4	5	7	1	17
Over 50% of Total Residents	4	2	1	6	13

Table Numbers of participants knowing their neighbors divided by age range

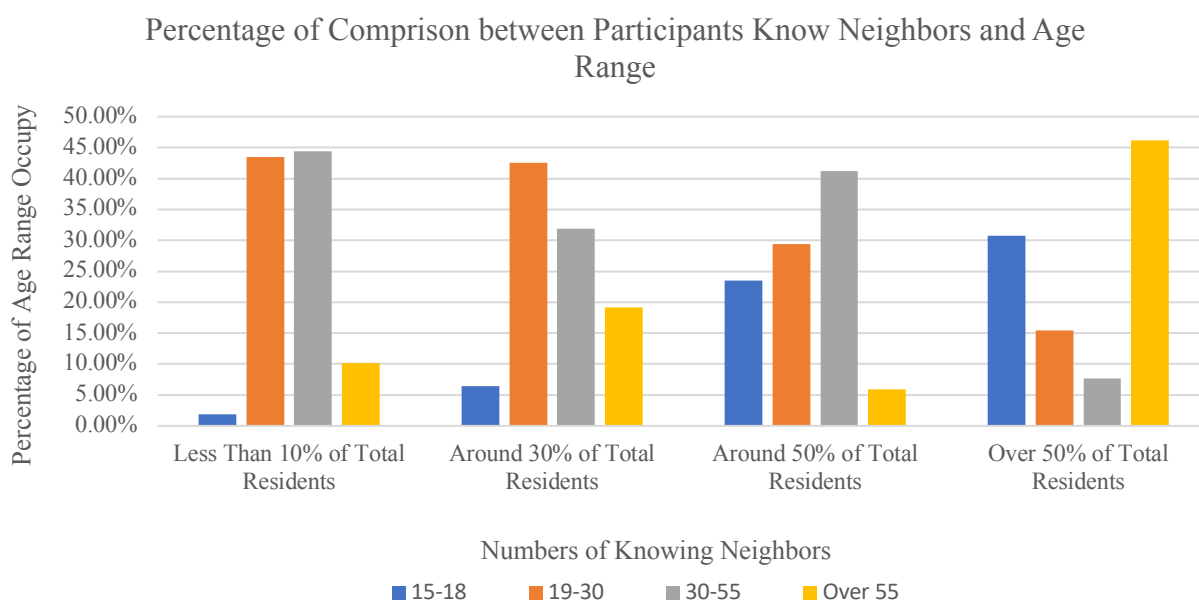


Chart 21: Comparison between participants' housing type and range age

From the table, most people, especially people aged 19 to 55, know less than 10% of total neighbors in their community in this survey. As mentioned before, young people and mid-aged people have their friendship circle already and would like to spend time inside, which reduce the opportunities of knowing each other in the same building. However, in the type of people who are knowing 50% of total neighbors, senior people are more than mid-aged people and teenagers, because they have more free time to communicate and recognize their neighbors. Also, social interaction with others is one of the most effective ways for them to avoid loneliness.



Compare Q1 age range and Q11 Opinion about social interaction in high-rise housing

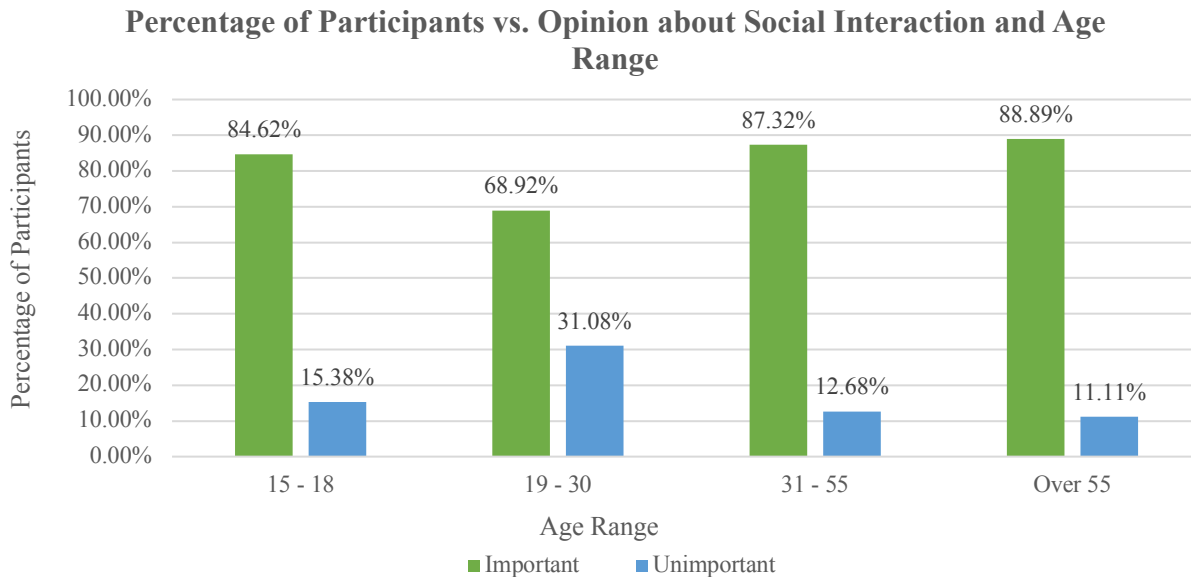


Chart 22: Comparison between participants' opinion about social interaction in high-rise and range age

Most Participants deem the importance of social interaction among residents in a high-rise housing form this chart. In addition, compared with people aged from 19 to 30, the percentage of people in the other three age ranges is higher. For the teenagers, they are the right age to play and build friendship with same aged people after school, they have more need for social interaction in the residence. And for people aged 31 to 55 or over 55, some of them have the experience of living in traditional Chinese housing or Tube-shaped apartment buildings in the past <sup>2</sup>, they used to have close and strong relationships with their neighbors, so that even in the new high-rise residential buildings, they are still sincerely looking for the connections with others, that is why they think social interaction is quite important. However, for the people aged from 19 to 30, they pay more attention to their work and own family, which lead to some of them hardly place social interaction with neighbors as the most essential position during the period.

<sup>2</sup> 4. Change of Chinese residential housing

Compare Q1 age range and Q14 aspiration of living in high-rise housing

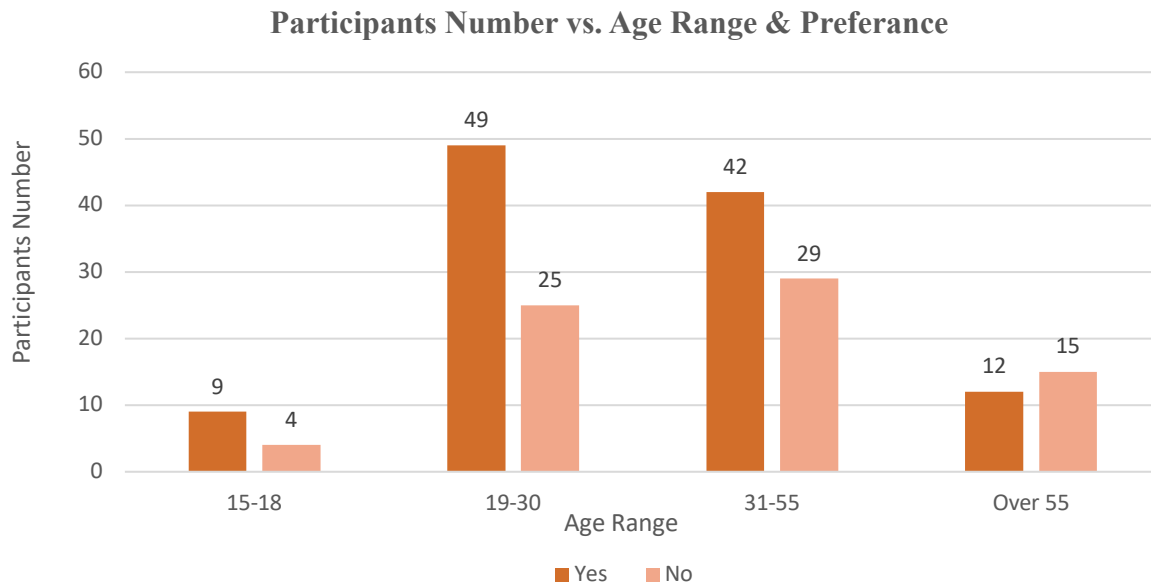


Chart 23: Comparison between participants' aspirations of high-rise living and range age

The chart indicates that teenagers, young people and mid-aged people are mainly willing to live in high-rise buildings in urban areas. Living in high-rise buildings is not unacceptable for most people, people can enjoy great city view and safer living environment. Inversely, senior people would like to live more closer to ground due to they more like outdoor activities on ground level, but living on higher level in high-rise buildings means they are isolated in the “sky”, which is harmful for their health either. On the other hand, a lot of old people will lose connections with their friends after moving to high-rise buildings located in urban areas from their old community, that is another reason for why senior people are unwilling to live in high-rise housing in cities. Moreover, near 40% of old people want to live in high-rise buildings, probably because the elevator as the primary vertical circulation way in high-rise buildings is more convenient and safer than stairs compared with middle or low-rise buildings for old people, and the newest high-rise building community always have well-designed public spaces or senior center, old people could have better living environment in such residential community.

Compare Q1 age range and Q20 aspiration of ideal housing

	Ideal Housing Type				
Age Range	Big Private Room Small Public Space		Small Private Room Big Public Space		Total Numbers
	Numbers	Percentage	Numbers	Percentage	
15-18	8	61.54%	5	38.46%	13
19-30	69	93.24%	5	6.76%	74
31-55	58	81.69%	13	18.31%	71
Over 55	25	92.59%	2	7.41%	27

Table 1: Numbers of participants' selection about their ideal housing based on age range

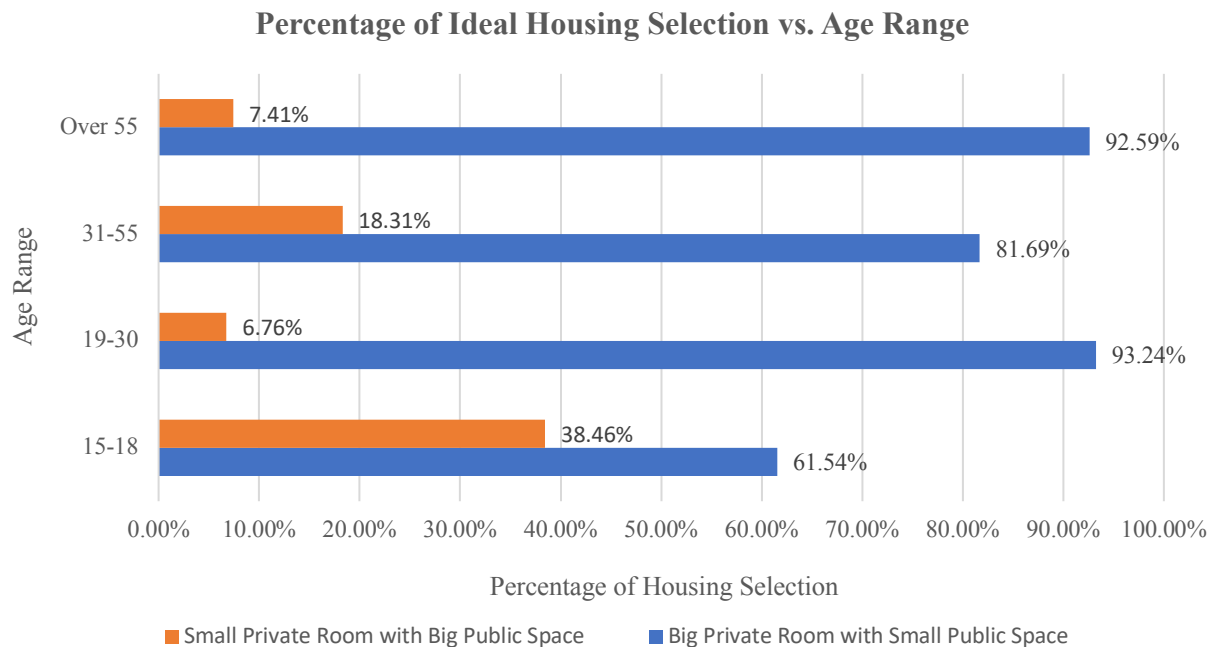


Chart 24: Comparison between participants' ideal housing type and range age

From the table and the chart, although the vast majority of people would like to live in the apartment which has big private room with small semi-public and public space, different from senior people and mid-aged people, more children and teenagers have higher aspiration to the bigger public space for entrainment, exercises and social interaction within their residential housing.

Compare Q2 educational background and Q17 if feeling uncomfortable and unsafe when sharing information with neighbors during social interaction

	Feel Uncomfortable and Unsafe When Share Personal Information				
Educational Background	Yes		No		Total Numbers
	Numbers	Percentage	Numbers	Percentage	
High School	40	78.43%	11	21.57%	51
Undergraduate	75	74.26%	26	25.74%	101
Graduated	17	70.83%	7	29.17%	24
Ph.D. or Over	6	66.67%	3	33.33%	9

Table 2: Numbers of participants' feeling about sharing personal information based on educational background

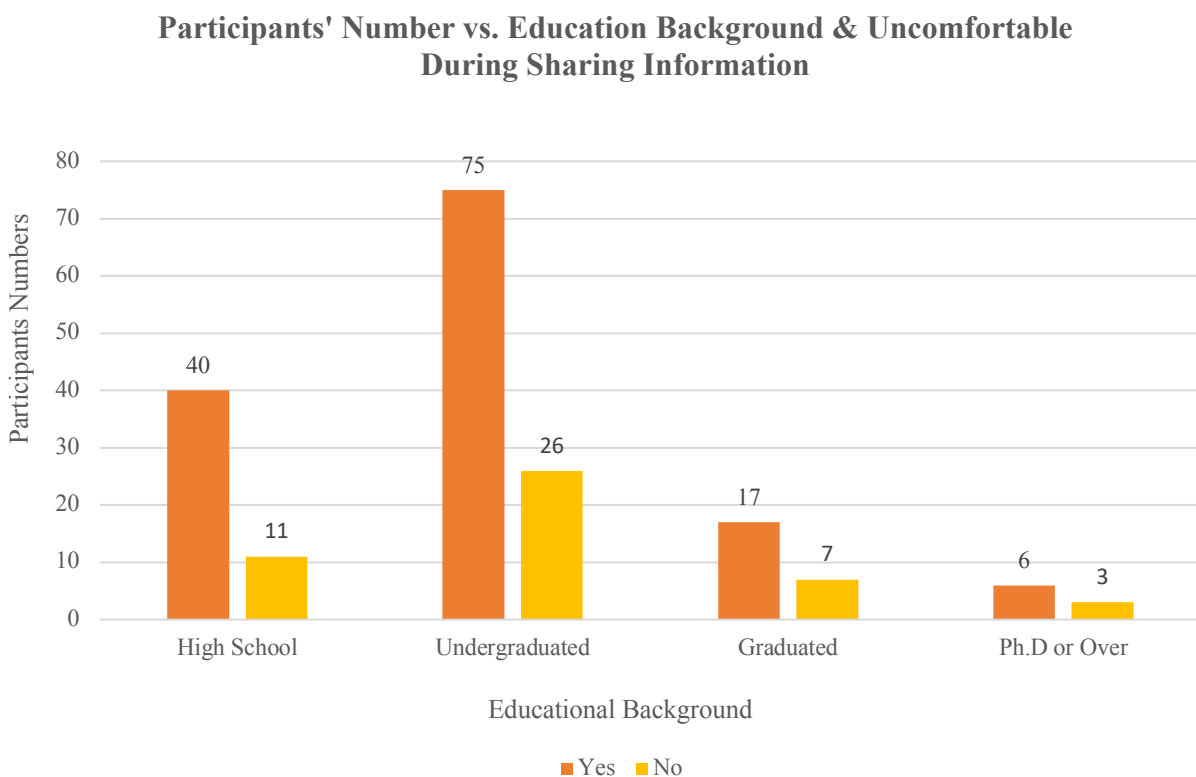


Chart 25: Comparison between participants' feeling during sharing information and educational background

The chart says that people have different educational background all mainly feel uncomfortable while they are sharing their personal information during social interaction.

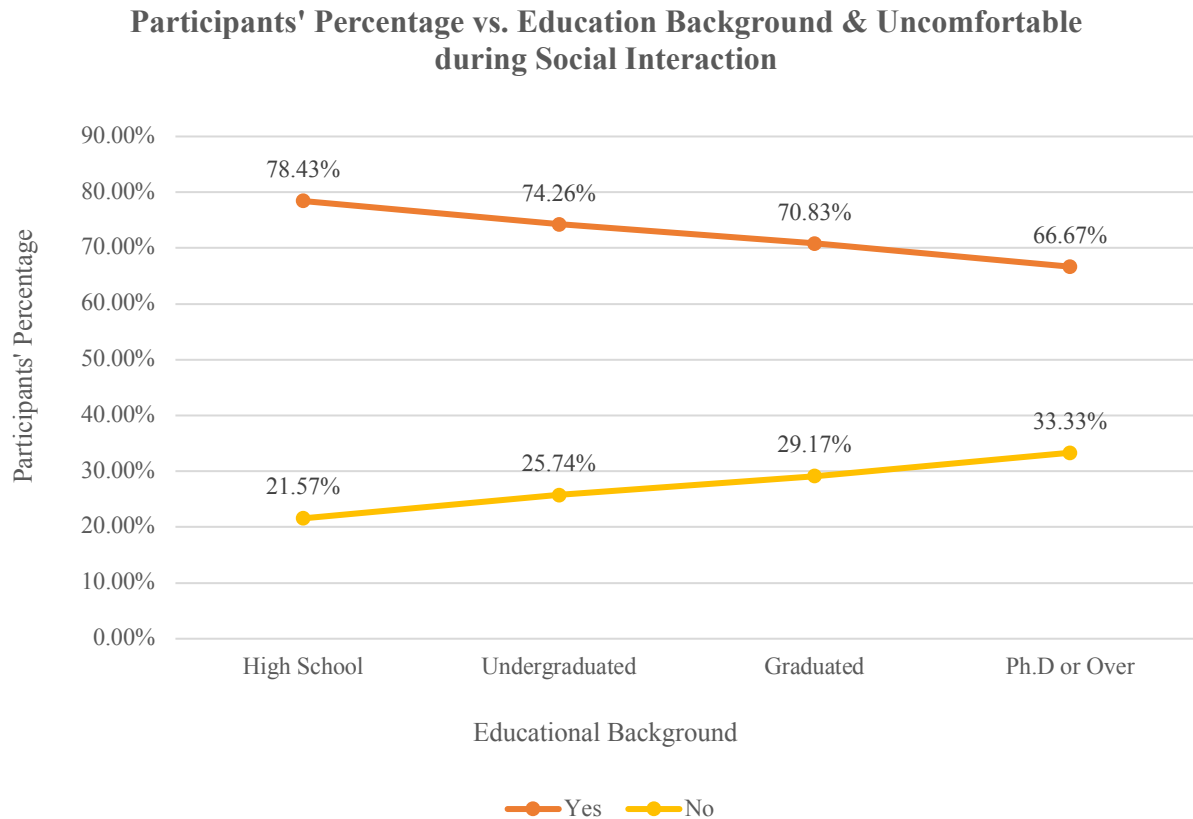


Chart 26: Comparison between participants' feeling during sharing information and educational background

However, the line chart indicates that more than 78% of participants who have high school educational background feel uncomfortable and unsafe when they share personal information with neighbors, only 21.57% of them do not have same negative emotions. Furthermore, compared with people who have lower degrees, only 67% of participants who have Ph.D. or higher degrees are unconvinced to feel good when share personal information with neighbors, but 33% of doctors or higher degrees do not too consternate on that. The result can be concluded that probably along educational level improvement, the sense of uncomfortable and unsafe from residents becomes weaker and weaker when they reveal or share their individual information to other neighbors during social interaction.

Compare Q3 family structure and Q11 opinion about social interaction in high-rise housing

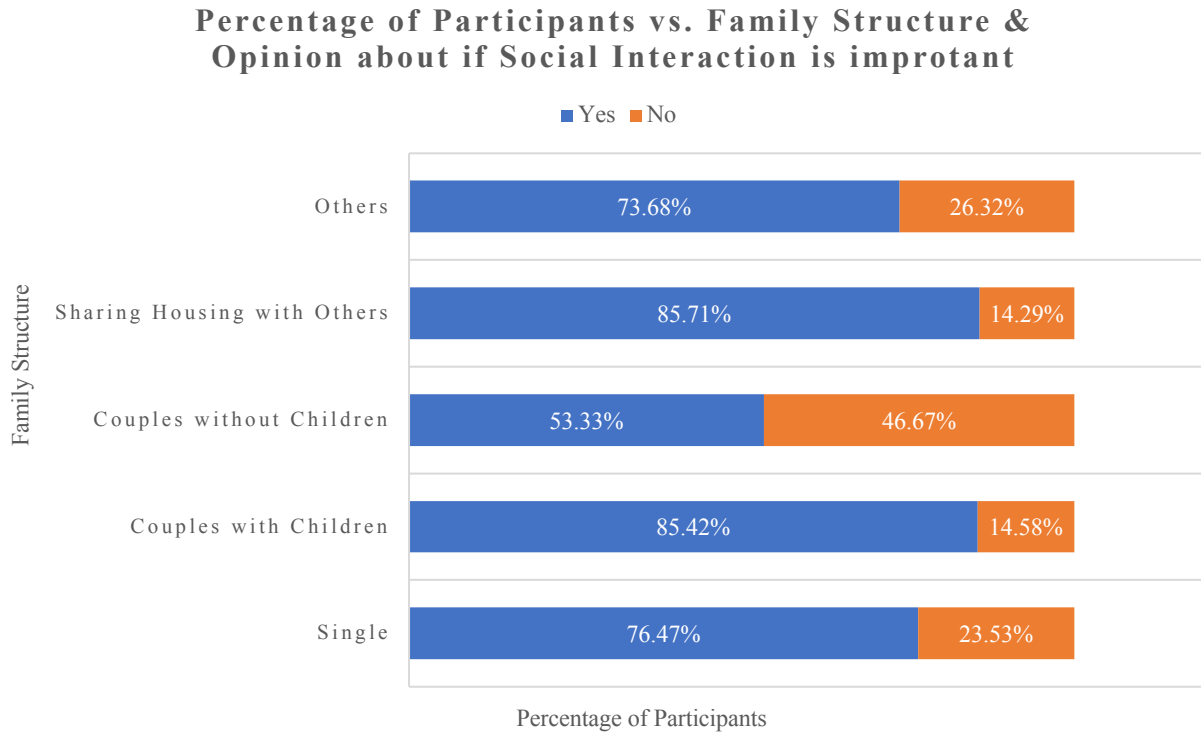


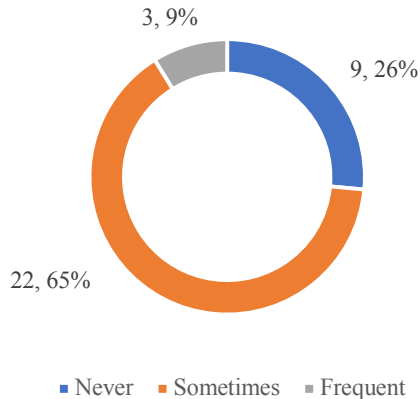
Chart 27: Comparison between participants' opinions about if social interaction is important based on family structure

According to the statistics chart, in the family types of single, couples with children, rental housing and others, over at least 73% of participants from each of these family structures agree that it is essential for them to have social interaction with neighbors in daily lives, and only 26% of ones disagree with that. Furthermore, more people in the groups of people who are sharing housing with others and couples with children do realize how social interaction would positively impact on their lives than other kinds of family structures. However, 46.67% of couples without children ignore the importance of social interaction while living, which is much higher than the people come from other kinds of family structures. The couples think that they have less need regarding communicate with neighbors, and they do not need to worry about social interaction among children because they do not have children yet, probably they take more care about their stable friendship circle and family members.

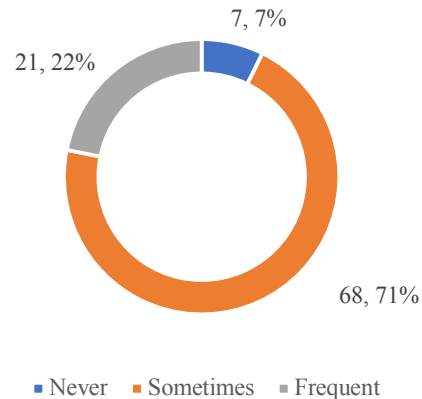


Compare Q3 family structure and Q23 Frequency of outdoor activities

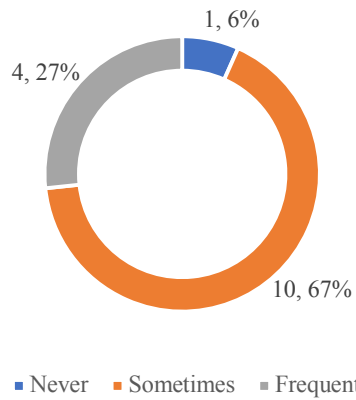
**Single People vs.  
Frequency of Outside Activities**



**Couples with Children vs.  
Frequency of Outside Activities**



**Couples without Children vs.  
Frequency of Outside Activities**



**Sharing Housing with Others vs.  
Frequency of Outside Activities**

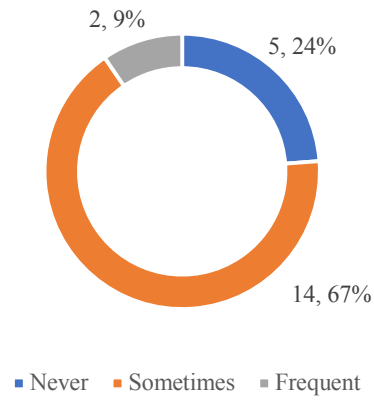


Chart 28: the frequency of outside activities in single people, couples without children, sharing housing with others and couples with children

The higher percentage of participants in the group of single people (26%) and a group of people sharing housing with others (24%) never do outside activities, compared with couples with children (7%), couples without children (6%) and others (10.53%). People who are living alone probably more like being detachment and independent; some of them reject to have outside activities and group activities. Moreover, couples without children have more interested in going outside than other types.

Compare Q4 family structure and Q8 Have social interaction with neighbors before

	Housing Type and If Have Social Interaction Before				
Have Social Interaction Before	Householder		Rental Housing		Total Numbers
	Numbers	Percentage	Numbers	Percentage	
Yes	93	75.00%	31	25.00%	124
No	26	42.62%	35	57.38%	61

Table 3: Numbers of participants' experience about if have social interaction based on educational background

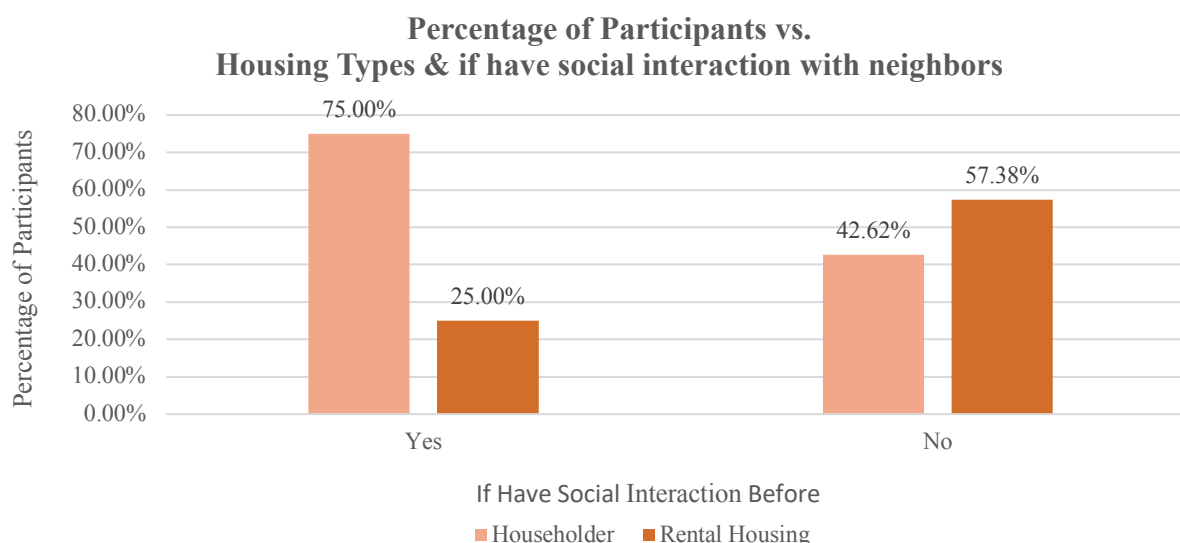


Chart 29: Comparison between if participants have social interaction before based on family structure

More tenants (57.38%) do not have social interaction with neighbors before compared with householders (42.62%). People renting house not treated as settled as householders, they are more flexible to move out and harder to have credibility, and also, they not deemed to be trusted easily by others, so that they hardly have social interaction with their neighbors. Nevertheless, people renting a house for living, especially when they frequently move to a new city or area, usually needed help and concern from neighbors. Hence, they should initially have more need and requirement about social interaction with others. Some of them try to interact with others but refused by other neighbors; now, it seems like tenants are isolated.

Compare Q5 housing ways and Q12 if the public space is well-designed for social interaction

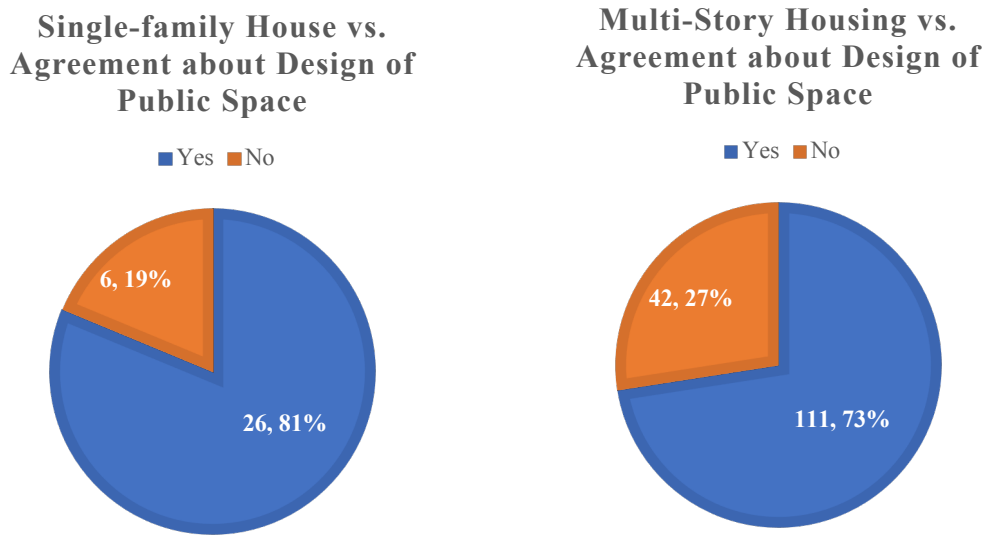


Chart 30: Participants' different opinions about public space design in single family housing and multi-story housing

As shown in the two pie charts, although generally over 70% of people in either single-family house or multi-story housing appreciate the public space design in community, when compared these two types, more percentage of people living in single-family house agree that the public space and semi-public space are designed well for social interaction than people living in multi-story housing. The fact certified that public space and semi-public space in multiple story housing are not designed well compared with a single-family house. First of all, the space between two multi-story buildings is always huge due to solar requirement, but the vast space does not have logically organized in some multi rise housing community, which leads to people feel unsafe and chaos when they try to have social interaction there. However, the same kind of space between single-family houses is easier to set because of its appropriate size. Secondly, the semi-public space inside the multi-story building, as the only place for people on the upper floors doing social interaction, cannot be designed much big, because people hardly want to live in an apartment with big semi-public space which they need to pay extra money for.

Compare Q5 Housing types and Q18 Social interaction and privacy

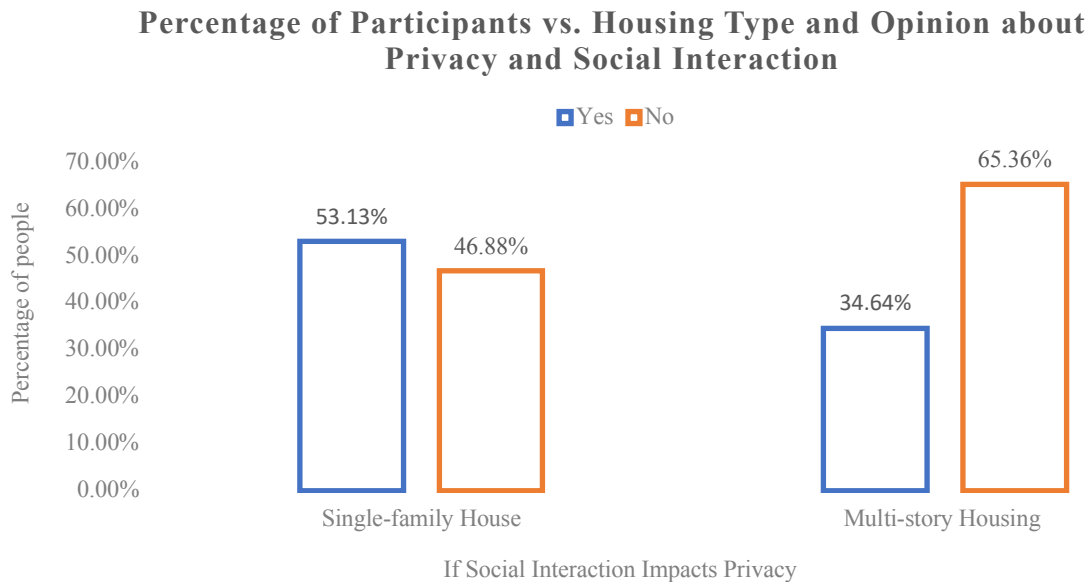
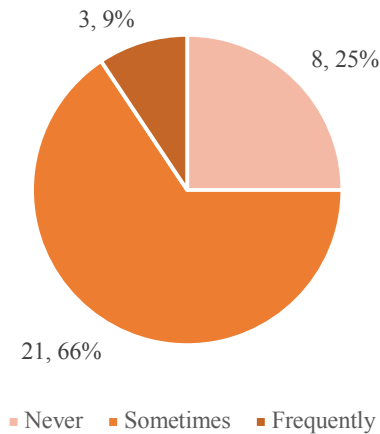


Chart 31: Comparison between if participants think social interaction impacts privacy based on living housing types

For the group of people who are living in the single-family house, more percentage of people feel that their privacy would be impacted when they interact with neighbors near their dwelling. Because generally, the residents who decided to live in a single-family house indicate that they pursue detachment and more independent, as well as care about their privacy and want to keep the certain distance from neighbors so that too close social interaction with neighbors would make them feel invasive. On the contrary, around 65% of residents who are living in multi-story housing do not deem that their privacy infringed during social interaction, they do not mind talking, playing, chatting and helping with neighbors in the shared semi-public spaces which are close to their private space. Therefore, in the future residential development, the edge between public space and semi-public space in the single-family house community should be more definite, that can be much helpful for people to have social interaction without hesitation in a single-family house community. Moreover, in the multi-story building, the different spaces should be hierarchical to protect resident's privacy as well.

## Compare Q5 Housing types and Q23 Frequency of outside activities

**Percentage of Participants in Single-family House vs. Frequency of Outside Activities**



**Percentage of Participants in Multi-story Housing vs. Frequency of Outside Activities**

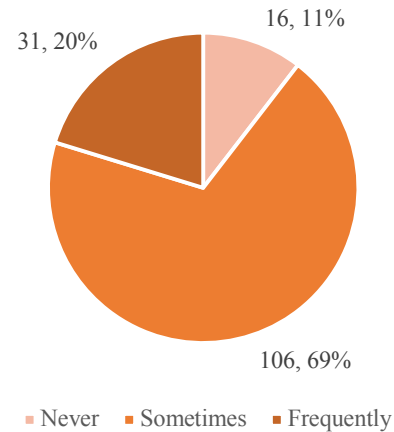


Chart 32: the frequency of outside activities from people in single-family house and multi-story housing

In the total 185 participants, 32 of them are living in single-family house now, and 8 of the 32 people, which occupies 25% of total people from single-family house, never do outside activities, , and only 3 participants, which occupies 9% of total people from single-family house, go outside frequently. For the rest 153 participants who are living in multi-story housing, 16 of them (only 11% of total 153) never do outside activities, and 31 of them (20% of total 153 people) go outside frequently. That indicates more people living in single-family house have less interested in going outside and having social interaction with neighbors even though most of them appreciate the design of public space in the community.<sup>3</sup> Like the result in last analysis, people more enjoy living independently and do not want to being bothered by others when they choose to live in single-family house <sup>4</sup>, that do reduces the opportunities of knowing each other for them, they used to their living performance and stable friendly circle already.

<sup>3</sup> Compare Q5 housing ways and Q12 if the public space is well-designed for social interaction

<sup>4</sup> Compare Q5 Housing types and Q18 Social interaction and privacy

Compared Q6 Housing types and Q14 Willingness of living in high-rise buildings

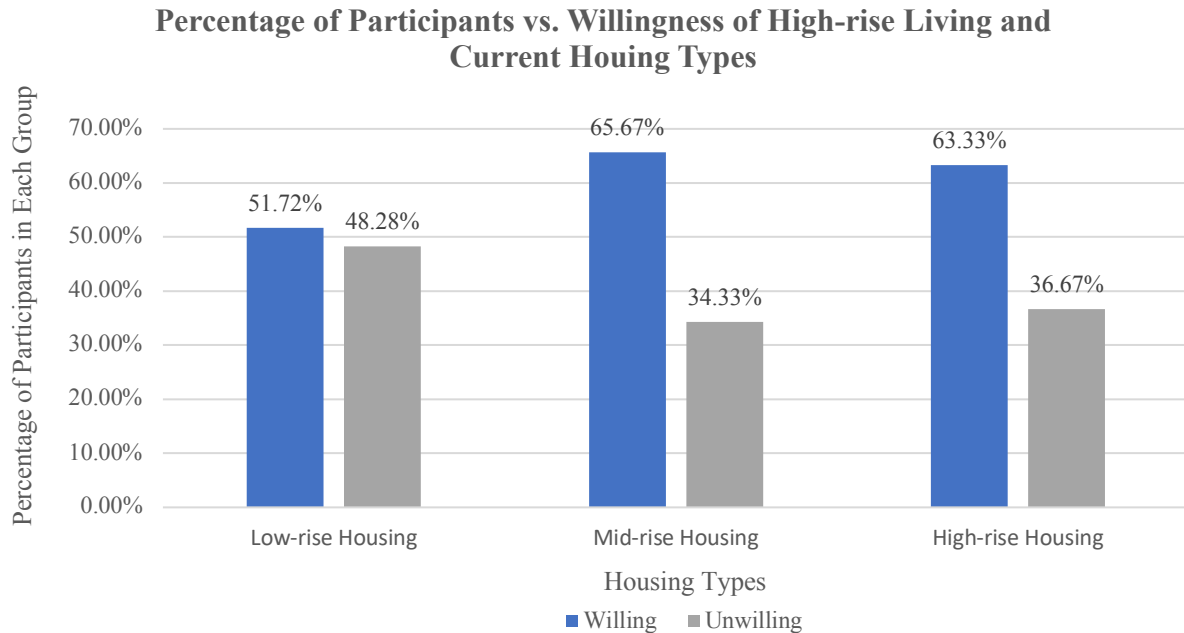


Chart 33: Comparison between if participants are willing to live in high-rise buildings based on living housing types

Generally, over half of total participants say they do not mind living in high-rise buildings in high-dense areas. Especially, in the total people who are not willing to living in high-rise buildings in urban areas, compared with the residents living in middle and high-rise buildings now, more people (near 50%) living in low-rise buildings express they are not expected to live in high-rise buildings now and future. However, with the urbanization improvement in China, the population will increase rapidly in urban areas, for example, in some Great Chinese cities, Shenzhen, Guangzhou and Chengdu, the growth rate of urban population is still increasing since 2010 (Trend of growth of urban population in Great Chinese Cities in 2018, 2019). Under this pressure, low-rise buildings might be unsuitable in high-dense areas in the future, not only the price will be multiple times of high-rise buildings, but also it will occupy a lot of useful land but accommodate less population compared with high-rise buildings. Therefore, the group of people who used to live in low-rise buildings might need to transfer the thoughts about high-rise living, and adapt to

elevators from stairs. After that, there are around 37% of high-rise residents also acknowledge they would not like to live in high-rise buildings. They might be tired of disadvantages of high-rise housing, such as waiting too long for the elevators, living too far away from ground, hardly having social interaction with neighbors and crowded residents in one building.

Compare Q6 Housing types and Q22 Have social interaction in elevators

	Have Social Interaction with Neighbors in Elevator				
Housing Types	Have		Do not Have		Total Numbers
	Numbers	Percentage	Numbers	Percentage	
Low-rise Housing	34	58.62%	24	41.38%	58
Mid-rise Housing	46	68.66%	21	31.34%	67
High-rise Housing	30	50.00%	30	50.00%	60

Table 4: Numbers of participants' experience about if have social interaction in elevator based on housing types

From the above result of Question 6, 58 participants are living in low-rise buildings, 67 participants residing in mid-rise buildings, and 60 participants living in high-rise buildings in the total of 185 participants. In this survey, among the 60 participants who are living in high-rise buildings, 30 (50% of 60) of them have social interaction in elevators, and among the 67 participants who are living in low-rise buildings, 46 (68.66% of 67) of them have social interaction with neighbors. That result shows that more percentage of people living in mid-rise buildings find pleasure in social interacting with others than people living in high-rise buildings. The reason might deduce as that people spend less time in the elevator before they arrive at their expected level in mid-rise buildings because of the total height. So that in middle -rise buildings the sense of nervous and uncomfortable is weaker in people's mind, that generates that people have more attention to notice and communicate with each other rather than focus on the running elevator case.



Compared Q7 Numbers of knowing neighbors and Q20 Preference of ideal housing

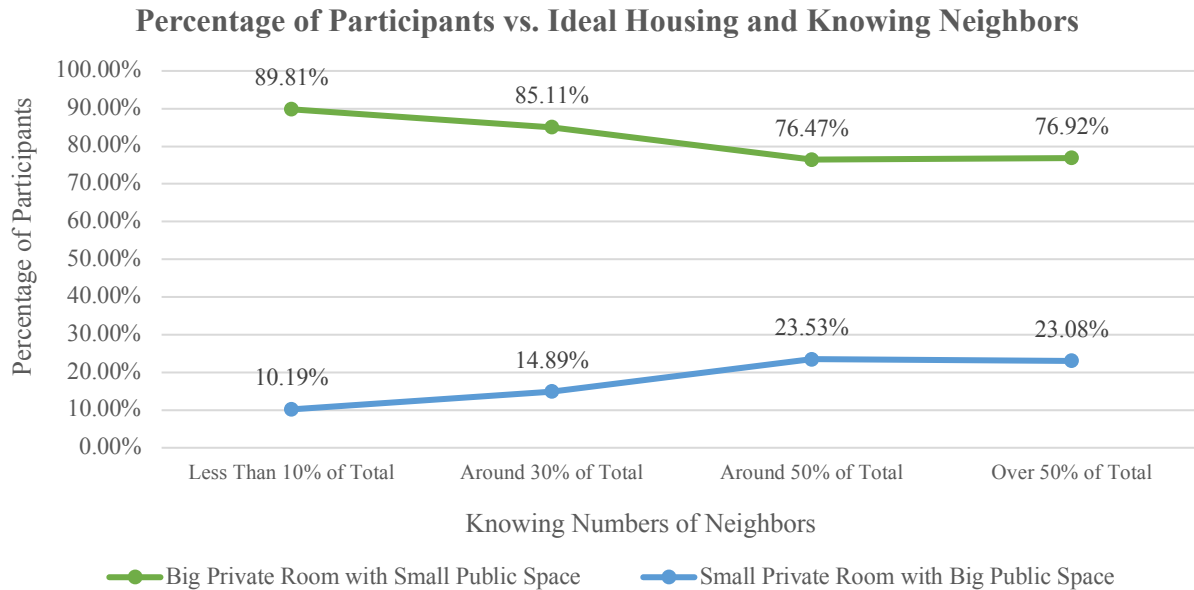


Chart 34: Changes of the two ideal housing based on the groups of people knowing different numbers of neighbors

Although the result of Question 20 already indicates that 86.4% of total participants choose “big private room with small public and semi-public spaces” as their ideal housing due to multiple reasons. In this analysis, when compare participants’ situation about knowing their neighbors and the choice between big private room and big public room, in the total 108 people who knowing less than 10% of total neighbors, only 10.19% of them choose small private room with big public spaces, however, in the 13 people who knowing over 50% of total neighbors, 23.08 of them choose the same option, which indicates that the percentage of people who choose “big public space and small private space” is generally increasing through the four groups of people in the chart. That can explain that when residents know more neighbors, they are more willing to live in the house with big public space but small private space. The group of people knowing more neighbors may illustrate that they do realize the importance of social interaction and need to have more social interaction with neighbors, which lead to that they aspire the bigger and better organized public space or semi-public spaces to achieve their expected connection with others.

Compare Q8 If have social interaction with neighbors before and Q11 Opinion about importance of social interaction in high-rise housing

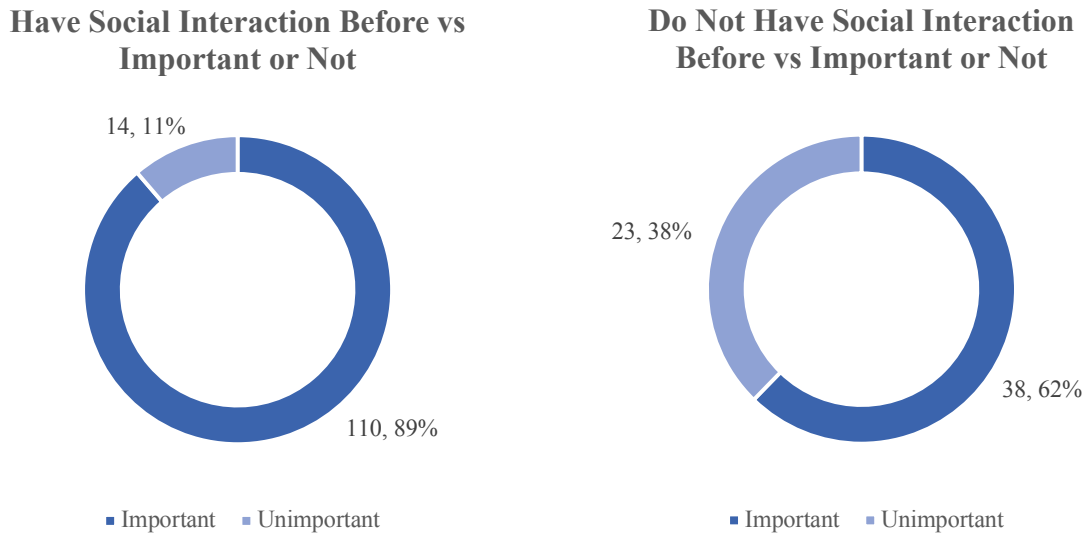
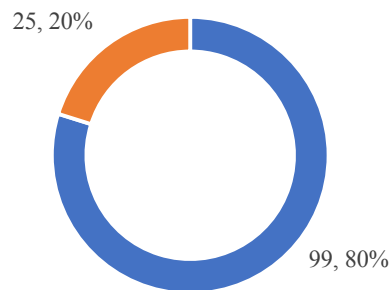


Chart 35: Participants' opinions about if social interaction is important in the groups of people who have and do not have social interaction with neighbors before

The above comparison chart tells that most people, whether they have the experience of social interaction with other residents before, deem that social interaction is far essential and necessary for their self-development, children growth, safe environment in high-rise housing. Even a lot of people do not want social interaction with neighbors before, and they still approve the importance of public life between buildings. Besides that, in the total 124 participants who have social interaction with neighbors before, only 14 people, 11% of them, think social interaction is unimportant in high-rise housing. However, In the total 61 participants who do not have social interaction with neighbors before, 23 people, which occupies 38% of the 61 people, ignore the importance and necessity of social communication in high-rise housing. Compared with another group of people who have social interaction with neighbors before, more percentage of people never having social interaction with their neighbors persuades themselves that communication plays an extra but unessential role in their daily lives,

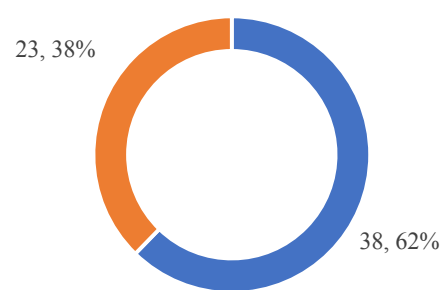
Compare Q8 If have social interaction with neighbors before and Q12 Opinion about design of public and semi-public spaces in the community

**Have Social Interaction Before vs. Opinions about Design of Public and Semi-public Spaces**



■ Well-designed ■ Not Well-designed

**Do Not Have Social Interaction Before vs. Opinions about Design of Public and Semi-public Spaces**



■ Well-designed ■ Not Well-designed

Chart 36: Participants' opinions about design of public and semi-public spaces in the community between the groups of people who have and do not have social interaction with neighbors before

From the two charts, around 38% of people who never have social interaction with neighbors before disagree that the semi-public and public spaces in the community are well-designed, while this percentage is higher than the group of people who have social interaction with neighbors before (20%). The public spaces without logical organized and the unprotected semi-public spaces might be one of the most critical aspects to obstruct residents' social interaction in Chinese high-rise housing now. That mainly causes that, in this survey, 12% ( $38\% \times 32.97\%$  - the percentage of people who never have social interaction before in total 185 participants <sup>5</sup>) of full participants lose interest and chance to communicate and do any social activities with other residents. On the other hand, in the people who have social interaction before, the overwhelming majority of the participants (80%) justify that the semi-public and public spaces are comfortable and suitable, this

<sup>5</sup> Question 8: Do you have social interaction with you neighbors?

would be a positive element to attract residents to have more public activities in such places. This result and comparison certify that public space and semi-public space in residence easily becomes the key to impact residents’ social behaviors, physically and mentally <sup>6</sup>.

Compare Q8 If have social interaction with neighbors before and Q23 Frequency of outside activities in the community

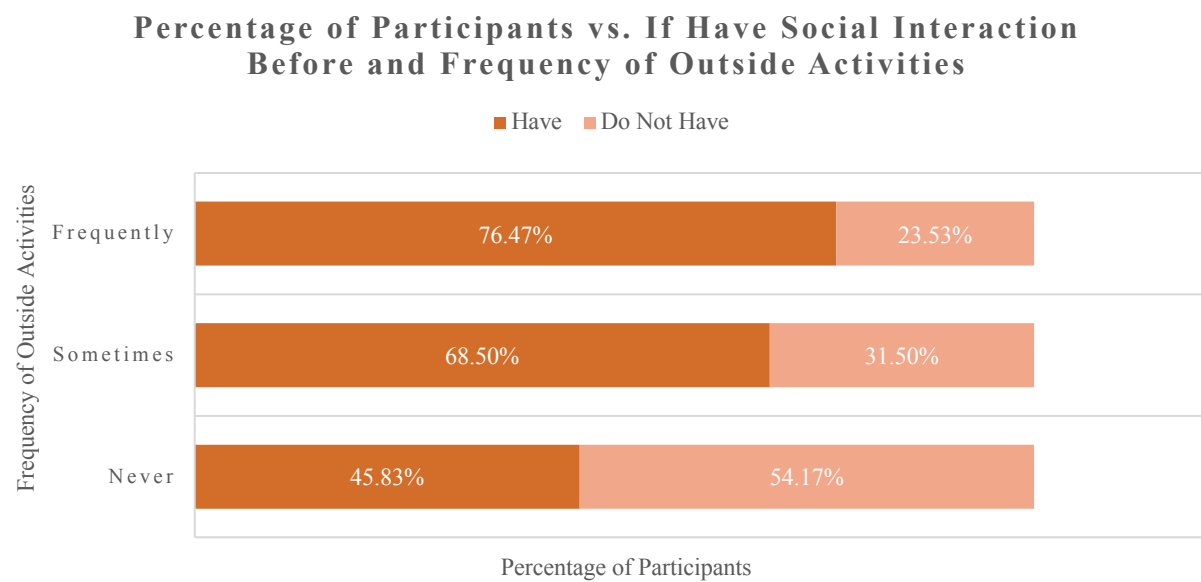


Chart 37: Comparison between if participants have social interaction before based on frequency of outside activities

From the analysis of Q23 before, in the 185 participants, 24 of them never have outside activities before. And among the 24 people. 11 people (45.83% of them) who never do outside activities but have social interaction with neighbors in other ways. On the contrary, the majority of people who either usually (76.47%) or sometimes (68.50%) go outside have social interaction with neighbors. Social interaction directly depends on the frequency of outdoor activities, the more time residents stay outside, the more chances they meet new neighbors and interact with each other.

<sup>6</sup> 1.2 Public space and semi-public space in high-rise buildings

Compare Q11 Opinion about importance of social interaction in high-rise housing and Q15 Ideal level range in a high-rise housing

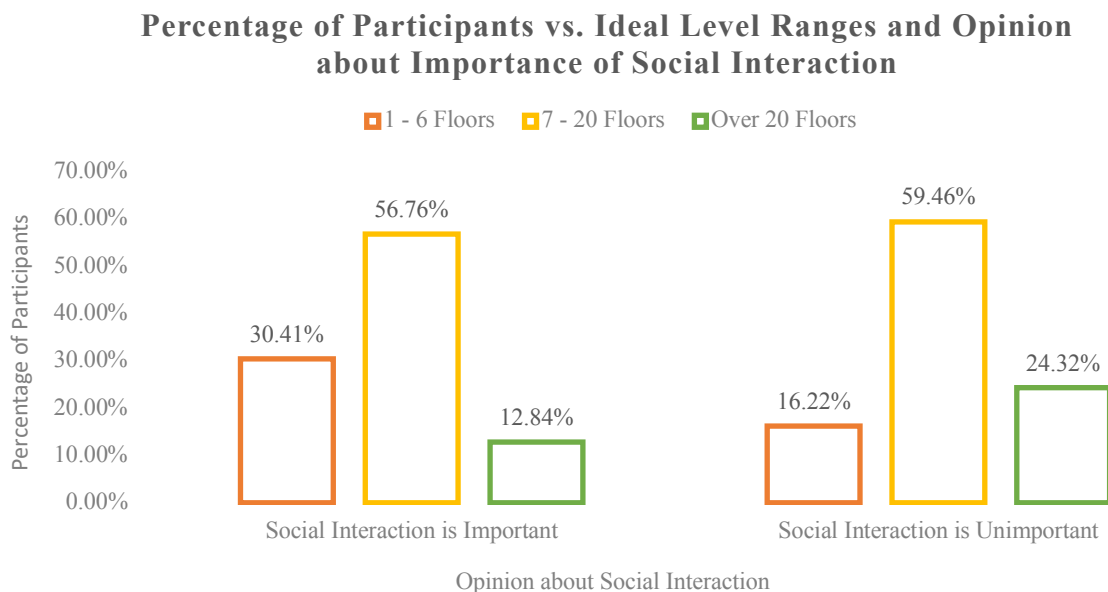


Chart 38: Comparison between ideal level range in participants' mind based on their opinion about social interaction

Most people (over 56% of total) regard 7-20 floors, which called middle levels, as their ideal living levels in a high-rise housing, whatever their perceptive about social interaction is important or not. Apart from that, in the type of participants who think social interaction is essential in high-rise housing, around 30% of them want to live in 1 to 6 floors, which much closer to the ground. However for another type of participants who deem social interaction is unimportant, only 16.22% of them are interested in living on lower levels, but 24.32% of them prefer living on high levels far from the ground level. For residents, 1 – 6 floors are unique from other middle and high levels in a high-rise housing, since people can use stairs rather than elevators frequently <sup>7</sup>, and spend less time to go downstairs then do outdoor activities. These typical characteristics of levels give rise to improve the opportunities of social interaction, and people may meet and chat with each other

<sup>7</sup> 1.2.7 Elevator space is not a comfortable place for social interaction

while climbing the stairs. Therefore, the more people who think social interaction is important would like to live on lower levels compared with other type of people who do not have the same opinions.

Compare Q11 Opinion about importance of social interaction in high-rise housing and Q20 Preference of ideal housing between big public space and small public space

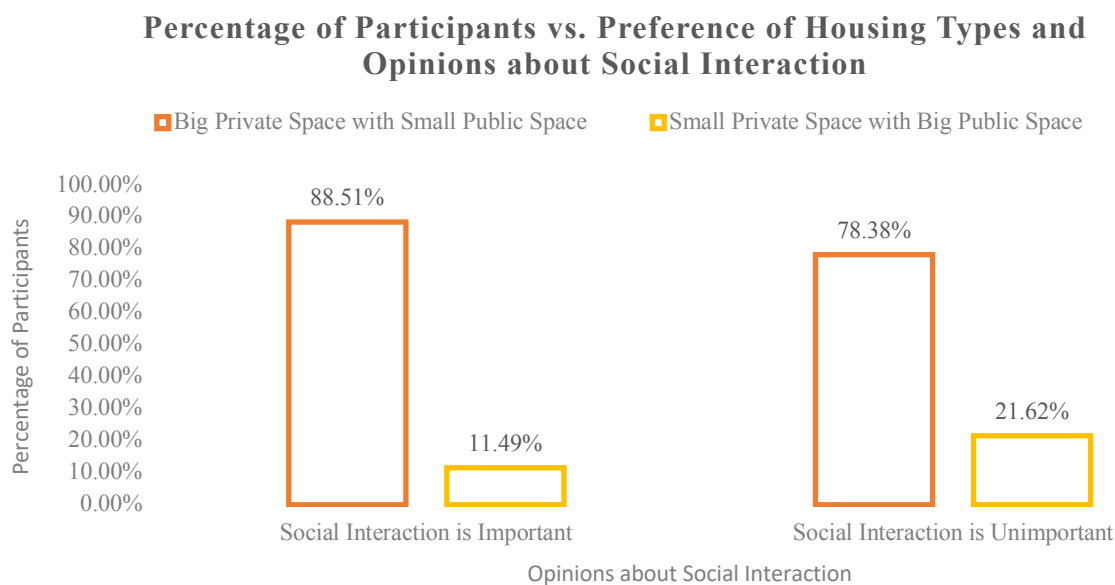


Chart 39: Comparison between participants’ performance of housing types based on opinion about social interaction

From this comparison, even though people think social interaction between and within residences is quite essential in their daily lives, most people do not feel like choosing the apartment or house which is small private space with big public space, mainly since the “extra fee” problem mentioned before <sup>8</sup>. It seems like that the importance of social interaction in residents’ minds is not much relative to living with a big public space, because they place area of public and semi-public space on the last important elements when they decide a house <sup>9</sup>.

<sup>8</sup> 1.2 Public space and semi-public space in high-rise buildings

<sup>9</sup> Q16 *What are your selection criteria when you choose a living housing?*

Compare Q11 Opinion about importance of social interaction in high-rise housing and Q22 Have social interaction in elevators

	Have Social Interaction with Neighbors in Elevator				
Opinion about Social Interaction	Have		Do not Have		Total Numbers
	Numbers	Percentage	Numbers	Percentage	
Important	92	62.16%	56	37.84%	148
Unimportant	18	48.65%	19	51.35%	37

Table 5: Numbers of participants having social interaction or not in elevator based on opinions about social interaction

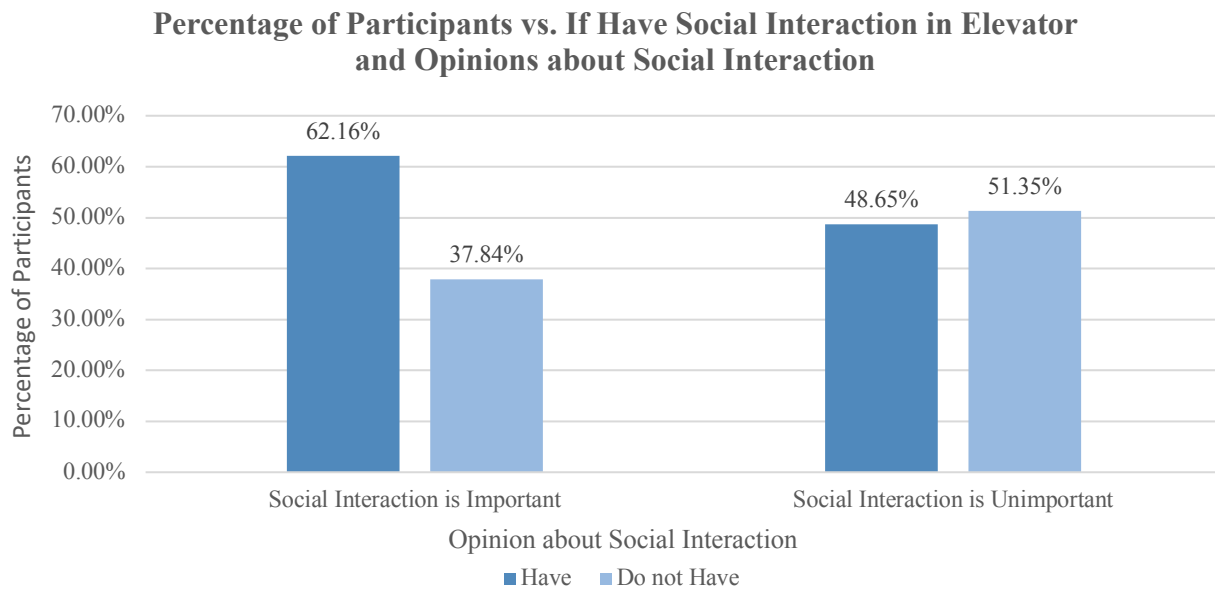


Chart 40: Participants having social interaction or not in elevator based on their opinion about social interaction

For the people who deem social interaction is quite essential high-rise housing, although the running elevator case is not a good enough place to have social interaction, most of them still are willing to communicate with others. However, there are near 40% of them cannot accept to interact with neighbors in the narrow and enclosure space. In the 37 people who do not think social interaction is important, the numbers of them either have social interaction in elevator or do not have are generally equal. It seems like there is no relevance between their attitudes about social interaction and where to interact.



Compare Q15 Ideal level range in a high-rise housing and Q18 Social interaction and privacy

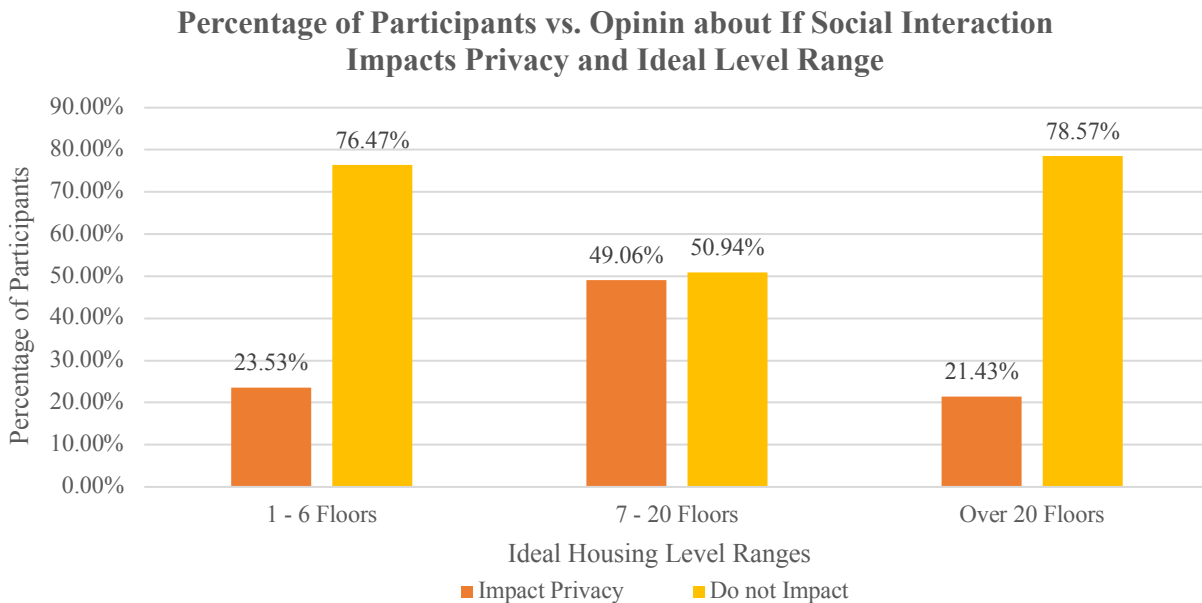


Chart 41: Percentage of Participants thinking social interaction impacts privacy or not based on ideal level ranges

From the comparison, the majority of people (over 76%) who want to live on 1 to 6 floors and over 20 floors feel that the social interaction with neighbors would not have negative impact on their privacy, and half of people who regard 7 to 20 floors as their ideal housing levels think social interaction would bother their privacy. Since the 1 to 6 level range is closer to the ground and there are higher people flow rate than higher levels, people used to live on 1 to 6 floors are more aware of protecting their privacy and might good at that, thus they can handle the balance between social interaction and their privacy. On the other hand, people living on over 20 floors have a few chances to meet and interact with far many neighbors every single day, accordingly, that reduces the possibility of getting involved their privacy. Nevertheless, seen from the result, living on the middle levels in a high-rise housing is a little bit difficult to clear the edge between privacy and interaction than the above two situations, that is why people on this range of levels do not feel private enough when they have social interaction with neighbors.

Compare Q15 Ideal level range in a high-rise housing and Q21 Use public infrastructure

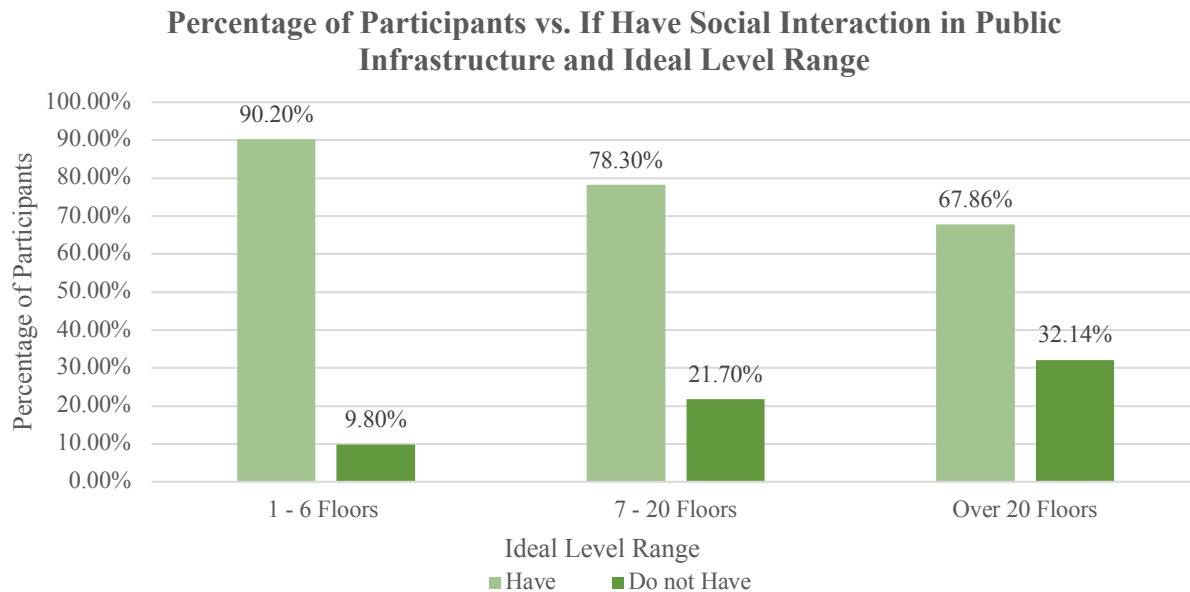


Chart 42: Percentage of Participants have social interaction in public infrastructure or not based on ideal housing level

Over 90% of residents who want to live on 1 to 6 floors will have social interaction with neighbors, but around 78% of residents preferring to living on 7 – 20 floors and around 68% of residents preferring to living over 20 floors will have. With participants' ideal housing level ranges increase, more participants would not like to have social interaction in the public infrastructure, such as community club, gym, and activities center, which always set on the ground level. Like mentioned in Literature Review, when residents live on higher levels, most of them feel inconvenient to go downstairs and use the public infrastructure frequently, even though the public infrastructure provided by community is quite completed and safe <sup>10</sup>. The inconvenient aspect including they have to spend more time to wait for elevators then finish the vertical circulation, it is likely impossible for them to go down or go up by stairs. Therefore, higher levels residents live, less social interaction happened among them in public infrastructure on the ground level.

<sup>10</sup> 1.2.5 Community planning has passive impact on social interaction

## Summary of Analysis

In the 185 participants, most of them are aged from 19 to 55, and most of them have undergraduate degrees.

Basically, residents who are renting an apartment for leaving occupy 35% of the total, especially the residents aged from 19 to 30. The majority of residents are living in multi-rise buildings in China now, and they feel free to live in high-rise buildings in urban areas, but in senior people's answers, more senior people still want to live in low or middle-rise buildings with bigger public spaces. Besides that, for the living preference, 7 to 20 levels in a high-rise housing are most popular floors in residents' selection.

For social interaction, in general, over 50% of participants just know few neighbors (less than 10% of total neighbors) in their residential buildings, while teenagers and senior people know more neighbors in their community compared with middle-aged people. Additionally, one-third of people acknowledge that they never tried social interaction with their neighbors, including greetings, talking, or playing, and that happened more often among tenements. Also, the people who are living above 20 floors have less interest in interacting with neighbors. However, in the rest of people who have experience of social interaction with others in the community, they just have a superficial relationship with neighbors.

In addition, for people's attitudes about social interaction, more residents have realized that social interaction between buildings is quite essential in people's lives, but except the people aged from 19 to 30 and the people who never have social interaction with neighbors before. Moreover, people aged over 30 think social interaction is part of their lives because they may have experience of living in traditional Chinese houses and group-living houses before which emphasize public contact. In the survey, more people are satisfied with the design of public and semi-public space

within their residential area. Also, they would like to interact with neighbors in public infrastructure and elevators. In this point, another analysis shows that people living in high-rise buildings are more tired of communicating with neighbors compared with other people living in low and middle-rise housing since the building structure and surrounding environment and space. On the other hand, people who focus on social interaction in residence would not mind interacting with neighbors in running elevators, and they do want to live on lower levels in high-rise housing. From this analysis of this survey, there are some reasons for why residents do not have frequent social interaction. Firstly, people sort the location, orientation, and level of an apartment, as the most critical elements when they select their ideal housing. However, the area of public and semi-public spaces placed in the last position in the residents' mind, which means residents pay more attention to personal living rather than public contact; Secondly, it is not easy for residents to trust their new neighbors initially, residents feel uncomfortable or unsafe when they try to genuinely develop the relationship or friendship with neighbors at the beginning, while they do not deem that social interaction would impact their privacy. What interesting is that with residents' education background level improving, residents become more acceptable when they interact with others. Thirdly, over 60% of people's outside activities are not frequent, due to they do not have enough energy and time after whole day work. Especially single people, people who are sharing housing with others, and the group of people who are living in a single-family house prefer to spend their free time home or indoor. The less outdoor time they spend, the less social interaction they have in the community. Finally, the public space and semi-public space are not well-designed and well-managed; different aged people feel chaos, inconvenient, and uncomfortable when they have outdoor social interaction.

## Suggestions

### 1 Clarify the edges between different spaces

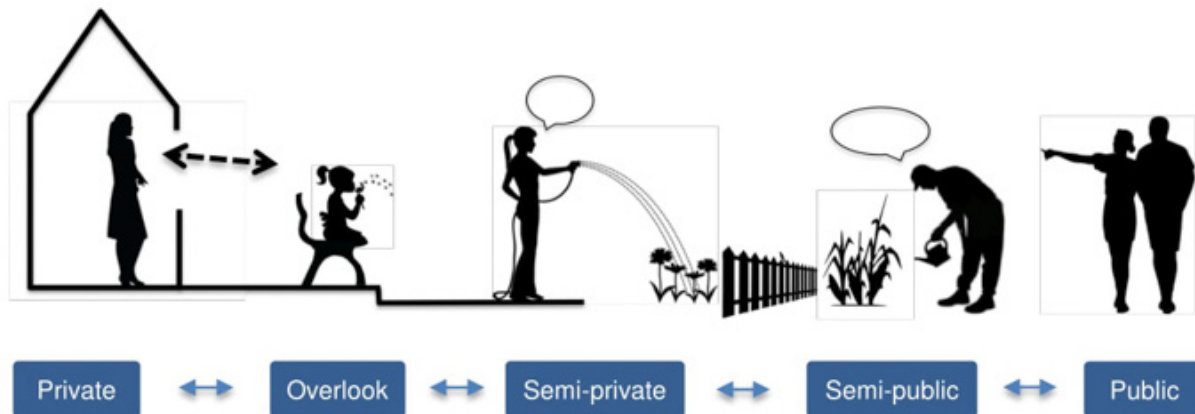


Figure 26 Relationship among different residential space

In order to protect residents' privacy and promote resident's experience of social interaction within the residential housing, from outside to inside, the different spaces should have clear hierarchies. Learning from traditional Chinese housing structure, residents would have an awareness of progressive and friendly when they are going through the different spaces<sup>11</sup>. For example, in semi-public space, residents would not be worried about their privacy and safety, and in the public space, they could have any social interaction with each other without hesitation. Otherwise, if the above different spaces do not have explicitly divided, residents possibly would have a sense of mess and unprotectable while doing exercise and activities.

Thus, the public space in the community and semi-public space between residential buildings should be logically organized and managed, as well as semi-private space inside the high-rise housing should be open with excellent airflow and enough daylighting.

<sup>11</sup> 3. Social interaction in Traditional Chinese House

### 1.1 Public space

The public space is not being disturbed by vehicle driveways and motor parking, and it should be divided into different zones in order to serve different aged people. Also, the underground parking might have some attractive ways connected with the ground floor, that can increase the frequency of people's outdoor activity rather than go private space directly (Hongyun, 2006). The children playground can locate in the center of the community, and a dog park is far popular to promote people's communication about their pets. And for the building itself, the first floor can set as retail or other commercial spaces, because residents use the ground commerce and service spaces more frequently than other public spaces according to previous survey (Research about public space in high-rise housing , 2015).

### 1.2 Semi-public space

Then in the whole community, the semi-public space near residential buildings is the most functional for high-rise residents to take outdoor activities. Especially for children and senior people, this kind of space is much safer and more convenient than a central garden or square in the community since it is closer to their residence. On the other hand, semi-public space gives residents' stronger sense of belonging than another public residential area because it is the first space when residents exit from their residence. Hence the design of these spaces should focus on people's scale and be friendlier, mainly aimed at senior people and children's needs. For instance, the space around the entrances of each high-rise buildings, which have the highest residents' flow rate, can be designed as a critical spot for residents to exchange information and communicate with each other; or children playground and senior people's exercise equipment can install in these locations.

The first floor of high-rise housing is continuous of ground semi-public spaces. In some previous high-rise housing design projects, first floor, even first two floors designing as the public area with some commercial shops or service rather than private living areas could be better for residents' social interaction and lives (Ding, 2018). Cause the first one to two floors do not have reliable privacy protection compared with higher levels, so that using public functional spaces to instead private spaces on these floors is under more mature consideration. Setting retail and other commercial shops on the first floor is convenient for residents' daily lives, and they do not need to walk or drive for a long distance to buy what they need. Also, first floor designing as public space can expend and import the outside landscaping into the inside, and provide residents more indoor areas with a better environment for activities and social interaction in the spaces.



*Figure 27 First floors designed as commercial spaces in Nanjing, China*



### 1.3 Semi-private space

Finally, the size of the semi-private spaces inside the building, such as elevator lobby, public balcony, entrance lobby, and corridor, can be appropriately increased in order to promote residents' social interaction. However, these indoor spaces are the last step before residents go back to their self-apartment so that the privacy protection in these spaces is also essential. Hence there should be visible partitions setting to guarantee residents' privacy during social interaction. For the vertical circulation space, the elevator lobby could not only be a waiting area but also be a place for residents doing simple activities inside the residential building, for example, older people can do exercise, children can play inside the building during a rainy day. Besides, the platforms of stairs can be more prominent with natural daylighting in some floors, which would also provide residents a room for social interaction when they do not want to go downstairs by waiting elevators. Besides, for the horizontal circulation space, the inside public corridor could have some landscaping and exciting spots to attract residents to stay awhile when they walk along, that can also increase the opportunities of social interaction inside the buildings.



*Figure 28 Corridor design in high-rise housing in Singapore*

Besides that, according to the previous survey about high-rise housing in Southern China, over 70% of participants are expected to add a public activities platform on some floors of the high-rise housing (Li M. , 2009). The platform or green courtyard inside the buildings would possibly improve frequency of residents' outside stay, airflow and solar needs, residents could meet and gather there to have social interaction.



*Figure 29 Inside public platform or public space design*

## 2 Policy optimizations about payment for public space

In Chinese typically residential policy, residents must pay extra required 18% to 25% for the semi-public and semi-private spaces when they finish purchasing a complete apartment, which includes part area of elevator lobby, chase spaces, corridor, staircase, public exterior walls, basement and public mechanical equipment (News, 2018). For example, residents pay \$250,00 to get an apartment with 100 square meters told by housing agent, but finally, they actually only have 70 square meters useable net residential areas, other 30 square meters are the shared semi-private

space for circulation and public use (CNR, 2018). It supposed to be a reasonable implement to solve the problem between population and limited land use in China, however, that fact leads to residents would like to choose shared semi-public space and semi-private space as small as possible to save cost, as time goes by, this preference become increasingly popular in Chinese residential market, so the residential developer keeps compressing the area of the shared public space in the limited footprint to meet residents' preference, even some land developers gain many benefits through increasing the rate of shared semi-private space in some areas.

According to the questionnaire, because a significant number of residents do not have many outdoor activities on the ground floor due to personal reasons, in the high-rise housing, semi-private spaces are the only areas for people to interact with others on each floor, which is away from ground level, such spaces should not only be used as a simple circulation or storage in current residential environment. Therefore, the fee of semi-private space should be charged less or even canceled in residential house payment policy in China, if the government does want to promote the current neighborhood's relationship because that can change residents' preference about the importance of public spaces. In fact, since 2018, experts have started to doubt the rationality of this policy, they suggest that the government might have part responsibility for construct this public, semi-public and semi-private spaces in a residential community from foreign experience (CNR, 2018). Alternatively, the government could have some other active policies to encourage housing developers to have full consideration of public spaces construction. Consequently, optimizing the domestic purchase policy in the future is one of the most effective ways to achieve the needs of social interaction from residents inside the high-rise housing.

### 3 Experience from Chinese traditional houses

As mentioned in Literature Review, in traditional Chinese houses, some functional elements would become an attractive spot for surrounding residents to get together and have social interaction with each, such as a well or an old tree, residents always wash their clothing together near a public well or play chess under the tree. Even in the old Tube-shaped apartment buildings, people have a close relationship since they share the kitchen and restroom. Therefore, in some projects regarding old community adaptive use, such old element can be saved to create new attractive space; also, some shared functional spaces can be set in the community or inside the building, people would quickly get closer while sharing such spaces.

### 4 Stairs and elevator

Although many participants in the analysis of the questionnaire saying that they can interact with others in the running elevator, the elevator has more limitations for social interaction compared with stairs, since residents have more time and feel less nervous about communicating with neighbors during climbing stairs. Hence improving the usage of stairs is another effective way to increase opportunities for residents' social interaction. For example, the elevator could only arrive in 1st, 5th, 10th, 15th, 20th and 25th floors in a high-rise building, for a resident living on 7th floor, after arriving on 5th floor, he/she need to climb 2-floor stairs to get to the destination. Thus, during the “travel” process, he/she might meet more different people then have more chance to interact with others. Additionally, the floors arrived by elevators could be designed as public aerial spaces rather than private apartments, so that residents can do some activities on these floors before going back home. Also, that can save much time because the resident does not need to wait for elevators to go downstairs.

The stairs play the most primary role for residents' circulation, and elevator become assistant for vertical travel in high-rise housing in this mode, people would spend more time in using stairs. In addition, in this mode, besides stairs, there is much more semi-private space for residents to get together and social interaction with each other.

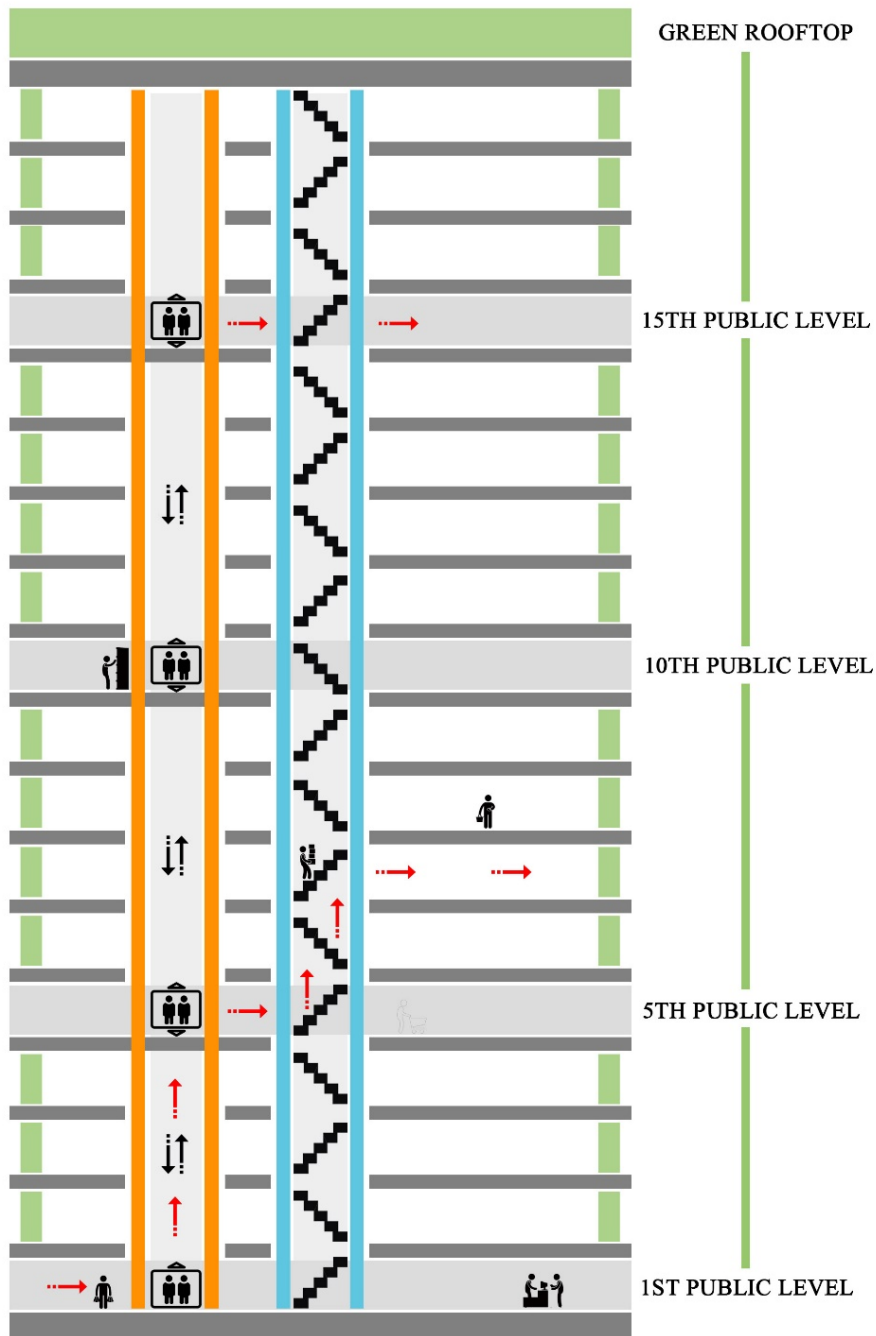


Figure 30 High-rise housing design mode for combination of stairs and elevator

## 5 Skybridge

Sky bridge connecting multiple high-rise buildings is another way to increase residents' contact space on horizontal dimensionality, but away from ground level. Since the limited footprint of each high-rise housing, Squareone studios proposed using sky bridges or corridor to connect two high-rise buildings, called “overhead city” in 2014 (Skybridge-creating horizontal high-rise habitat out of thin air, 2018). The increased areas in the air do fill the empty aerial spaces with human spaces, the sustainable way can bring civic views, airflow, daylighting and break the gap between each isolated high-rise building. Residents would have more outdoor space and areas horizontally to stay and interact with each other.



*Figure 31 “Overhead city” published by Squareone studios*

## Discussion

The proposed suggestions regarding achieve social sustainability needed to be verified in current Chinese society and under current residential environment. A questionnaire about Chinese people's attitudes would be assigned to investigate if those suggestions work.

*Question 1: how many floors of stairs will you accept when you go home?*

*A) 3 Floors, B) 5 Floors, C) 8 Floors*

*Question 2: Do you think setting commercial spaces on the first two floors of a high-rise housing would have good influence on promoting social interaction?*

*A) Yes, B) No*

*Question 3: Do you like having social interaction with neighbors on the skybridge or on the ground?*

*A) Skybridge, B) Ground, C) Both*

*Question 4: Do you like the design of combination of elevator and stairs when you go home?*

*A) Yes, B) No*



*Question 5: Do you think if reserving the old elements in traditional housing is still attractive for people to get together?*

*Choices: A) Yes, B) No*

*Question 6: In your mind, clarifying the edges of different private and public spaces is important or not?*

*A) Important, B) Not Important*

*Question 7: Do you agree that the public space in a community should be divided into different zones for different aged of residents?*

*A) Agreed, B) Not Agreed*

## **Analysis**

The second questionnaire assigned from December 2019, and collected on March, 2020. Totally 148 participants joining the survey.

*Question 1: how many floors of stairs will you accept when you go home?*

*A) 3 Floors, B) 5 Floors, C) 8 Floors*

96 people expressed that they can accept to climb 5 stairs when they go home, only 14 people say they would like to climb 8 floors. Thus 5 floors is the longest distance of stairs which can be accepted by residents.

***Question 2: Do you think setting commercial spaces on the first two floors of a high-rise housing would have good influence on promoting social interaction?***

***A) Yes, B) No***

Most (around 73.4%) participants say that they feel the commercial spaces on the first two floors of a high-rise housing would promote the social interaction in the residential areas.

***Question 3: Do you like having social interaction with neighbors on the skybridge or on the ground?***

***A) Skybridge, B) Ground, C) Both***

32 participants like having social interaction with neighbors on skybridge, 84 participants like having social interaction with neighbors on ground, and 32 people like both of the ways to communicate with each other.

***Question 4: Do you like the design of combination of elevator and stairs when you go home?***

***A) Yes, B) No***

For the design shown in the suggestion 4, 92 participants deem that the design is useful to promote social interaction, while 56 people deem that they dislike the design.

***Question 5: Do you think if reserving the old elements in traditional housing is still attractive for people to get together?***

***Choices: A) Yes, B) No***

In the 148 participants, 62 of them think the old elements might have positive influence on improving social interaction between buildings, but others, which occupies more percentage of participants think the old and traditional elements will change the social problem.

***Question 6: In your mind, clarifying the edges of different private and public spaces is important or not?***

***A) Important, B) Not Important***

During the survey, totally 102 participants, which 68% of total participants, agree that it is important to clarify the edges of private space and public space in order to protect their privacy.

***Question 7: Do you agree that the public space in a community should be divided into different zones for different aged of residents?***

***A) Agreed, B) Not Agreed***

In the 148 participants, 98 of them think the developer or designer of the community should be aware of dividing the public space into different zones.

### Summary of the Survey

The second question is aimed to verify if the suggestions suit current Chinese residential environment. According to the result, firstly most residents can accept to climb 5 floors when they go home, and more people think the design of combination of stairs and elevators can be useful to improve social interaction, thus this suggestion might work if it can be published in the future. Secondly, people enjoy communicating with each other on the ground more than in the sky, so people need more time to review the skybridges plan. Thirdly, the commercial space on first two

floors in a high-rise housing can promote social interaction among residents, and it is convenient for residents to enrich their lives in some ways. Fourthly, people prefer that their personal lives would not be interrupted while the social interaction with each other, so the privacy protection suggestion is helpful to improve social activities. Finally, different aged of Chinese residents now are tired of using public space and semi-public space at the same time, so diving those spaces into different areas according to ages group is positive to strengthen social connections between residents.

## Conclusion

Through the analysis of the research and survey, with Chinese housing styles changed, even though the situation of social interaction today not popularly appreciated in most residential areas, while social interaction between buildings still necessarily needed among Chinese residents in high-rise housing currently and in the future. High-rise buildings would be the most primary housing way in China in the future, and living in high-rise housing is generally accepted by most Chinese residents. Also, residents have realized the importance of social interaction in their living spaces, and most of them are tired of rustic living, hence promoting social interaction in high-rise buildings is pretty essential to optimize residents' living satisfaction.

In the past, in traditional Chinese housing and old-fashioned housing, residents have a closer relationship with each other, because people have to live together to get protection, and the structure of housing also successfully promote residents have much social interaction but guarantee living independence. The courtyard, public open space, and atrium in the housing improve and enrich people's daily lives. This theme of housing design never changed during housing development until the 1970s.

In the current generation, people with different ages, different backgrounds, different family structures, and different living styles have multiple reasons for less social contact with neighbors, but the series of problems of public space, semi-public space, and semi-private space is the common barrier to hinder residents' social interaction. In order to change the social phenomenon, solving the design troubles of spaces is the principal method. As discussion before, firstly, learning from Chinese traditional housing, clarify the edges between different layers of spaces to remind people's sense of belongings, then re-design public space and change structure of community

planning, increase size of semi-public space and semi-private space in the high-rise buildings; secondly, change the policy of payment for semi-private space to indirectly promote public space development in high-rise community; thirdly, for adaptive design for an old community or a village, saving some landmark elements to create a memorial space for residents; fourthly, improve the usage of stairs in high-rise housing, and change the relationship between stairs and elevators to increase people's travel time and opportunities of social interaction; finally, importing sky bridge to enrich residents' outdoor activities. These suggestions are aimed to physically push residents to contact with each other in some ways.

Overall, social interaction is indispensable in Chinese residents' life within high-rise housing. High-rise buildings should not just be a living container, and it must accommodate residents' emotions and needs of social interaction as well. The residence is the connection between strangers and different people; social interaction improvement between residence is significant to coalesce the Chinese society.

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